GENERAL LIBRARY
DEC 27 1919
UNIV. OF MICH.

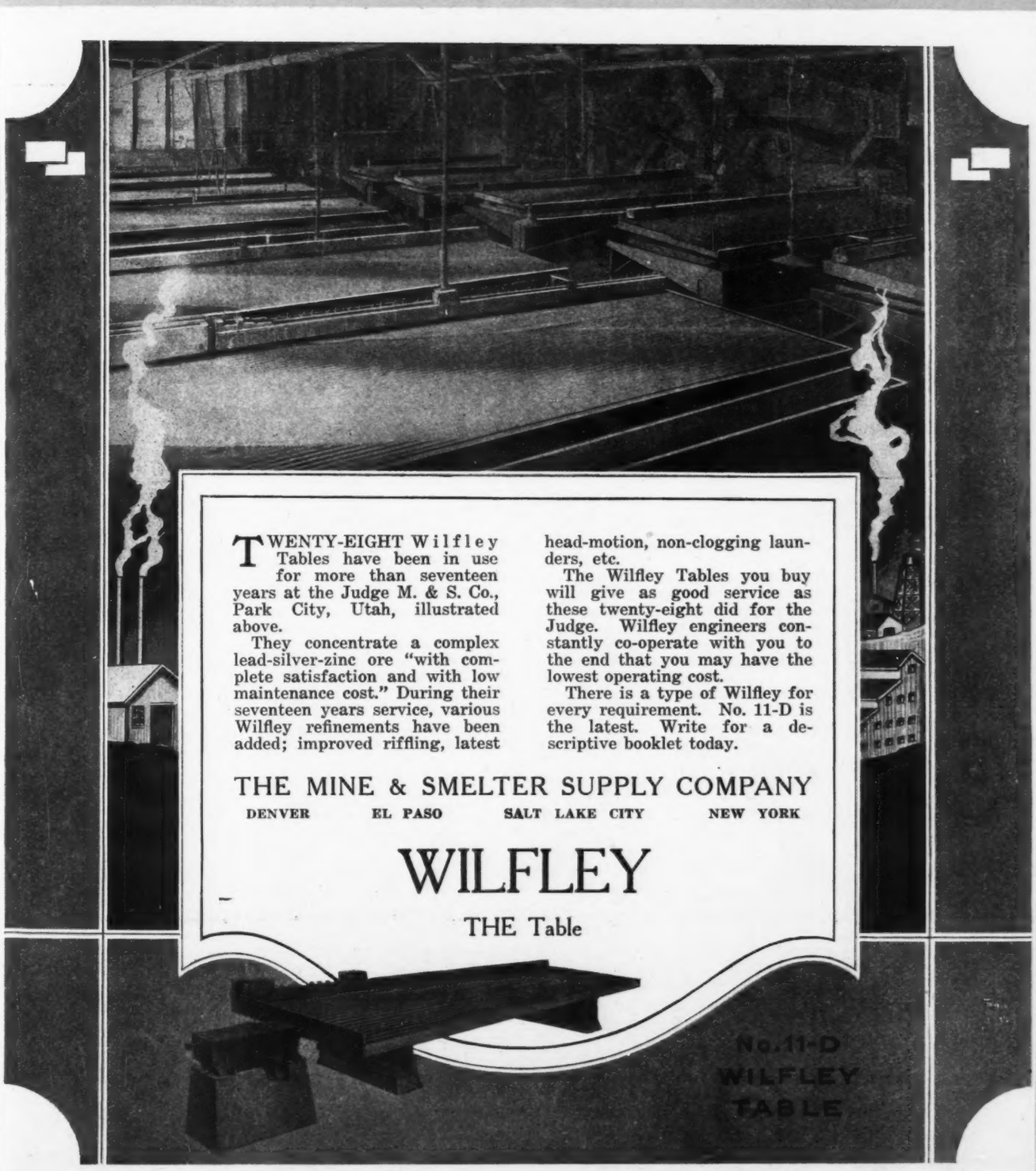
Published December 11 with Current News

Engineering and Mining Journal

McGraw-Hill Co., Inc.
New York and San Francisco

Price, 20c.

November 8 and 15, 1919



TWENTY-EIGHT Wilfley Tables have been in use for more than seventeen years at the Judge M. & S. Co., Park City, Utah, illustrated above.

They concentrate a complex lead-silver-zinc ore "with complete satisfaction and with low maintenance cost." During their seventeen years service, various Wilfley refinements have been added; improved riffling, latest head-motion, non-clogging launders, etc.

The Wilfley Tables you buy will give as good service as these twenty-eight did for the Judge. Wilfley engineers constantly co-operate with you to the end that you may have the lowest operating cost.

There is a type of Wilfley for every requirement. No. 11-D is the latest. Write for a descriptive booklet today.

THE MINE & SMELTER SUPPLY COMPANY

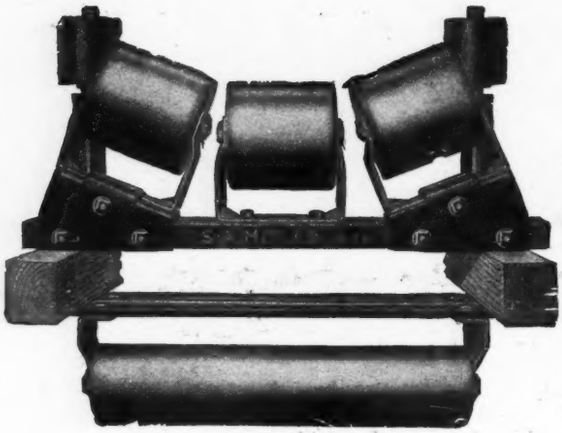
DENVER EL PASO SALT LAKE CITY NEW YORK

WILFLEY

THE Table

No. 11-D WILFLEY TABLE

S-A UNIT CARRIERS



FOR BELT CONVEYORS

Initially, S-A Unit Carriers may not be the least expensive as far as the purchase price is concerned. The ultimate cost of a conveyor carrier, however, cannot be determined by its sales price.

Write for Prices

The reliable service given by the S-A Unit Carrier in addition to the savings incurred in power, belt wear and lubrication, makes this carrier the best investment for the discriminating purchaser.

STEPHENS-ADAMSON MFG. CO.

AURORA, ILLINOIS

New York, N. Y.
Chicago, Ill.
St. Louis, Mo.
Boston, Mass.

Pittsburgh, Pa.
Detroit, Mich.
Los Angeles, Cal.
Cincinnati, Ohio

Salt Lake City, Utah
Huntington, W. Va.
Toronto, Canada
Vancouver, B. C.

Johannesburg, South Africa
Sydney, Australia
Kristiania, Norway

Osaka, Kobe, Yokohama, Tokyo—Japan
Calcutta, Bombay, Singapore, Rangoon—India

Published December 11 with Current News

Engineering and Mining Journal

JOSIAH EDWARD SPURR, Editor | WALTER RENTON INGALLS, Consulting Editor | GEORGE J. YOUNG, Western Editor | D. E. A. CHARLTON, Managing Editor | A. H. HUBBELL, E. P. McCRORKEN, EDWARD H. ROBIE, HARRY J. WOLF, Assistant Editors

Volume 108 | New York and San Francisco, November 8 and 15, 1919 | Number 19

An Announcement to Our Readers

We desire to thank each one of our readers personally for the gratifying support that has been given us during our fight with the radical printing unions, which has now been successfully terminated with the complete vindication of the "Engineering and Mining Journal." Despite the fact that a number of issues of the "Journal" have been delayed on account of this trouble, we have not received a single letter reproaching us for this delay or exhibiting any impatience from our subscribers. On the other hand, we have received many letters encouraging us and exhorting us to stand pat, as we have done.

Our advertisers have been equally generous with us. They have told us to go ahead and repeat their copy as often as expedient. Combined co-operation of subscribers and advertisers has, in short, been most gratifying.

It required a good deal of effort for us to take up publication in San Francisco, and that this was successfully accomplished is due in a large measure to those editors who took charge of this work in San Francisco—Mr. Charlton and Mr. Young—and also the hearty co-operation which we received in the plant of the "Journal of Electricity," both from the management and from the workmen. It may take some little time before things settle down to normal in our New York printing office, and considerable adjustment will be necessary before transferring the publication back to New York, which we will do as soon as possible.

Our problem now is to catch up as fast as we can with the delayed issues. On account of the limitation of our plant, it is hardly possible to get out an issue in less than five days, and we have decided to double up the editorial section for two issues, thus bringing the reader up to date by the beginning of January.

This expedient of double issues, it is hardly necessary to say, is vastly more expensive, inasmuch as we, by so doing, omit the equivalent of two complete issues of advertising. We feel, however, it is a matter of duty on our part to bring the reader up to date on his issues just as soon as possible, and also a duty, on our part, to pay the cost of this strike out of our own pockets and not to pass it along to the advertisers. It is the "Engineering and Mining Journal's" cash contribution to the cause of sane American industrialism. In this issue, therefore, we are publishing an enlarged editorial section covering the issues of Nov. 8-15, but the advertising section corresponds to one issue only. We plan to double up again in this way in the near future, and then, having caught up with the current issue, we hope to greet you as regularly and heartily in the future as we have in the past.

THE growth of the Journal calls for an expansion of its staff, which is already so adequate that it has been divided between New York and San Francisco without interfering with efficiency at either end. We should like applications for the position of an editor to take especial charge of our petroleum section and another to take special charge of the non-metallic mining section, which we purpose introducing as soon as present mechanical difficulties have been passed. Applications for either of the above-named positions should be addressed to the New York office.

The Gold Mining Problem

HIGH prices for other metals and other commodities only mean decreased earnings or downright disaster to the gold miner, for they increase the cost of his supplies and labor, whereas the price of his product is fixed. More accurately speaking, his product correspondingly decreases in price. The price of potatoes or wheat or iron is expressed in terms of gold, the standard measure of value. A quotation of potatoes at $2 a bushel means that a bushel of potatoes will buy a tenth of an ounce of gold; when potatoes are $1 a bushel, a bushel will buy only one-twentieth of an ounce. Conversely, the price of gold may not be determined by the arbitrary and fixed quotation of $20.67, which means nothing—saying in effect that an ounce of gold is worth twenty times one-twentieth of an ounce of gold—but by its purchasing power of some other standard commodity.

At present, then, an ounce of gold will buy ten bushels of potatoes, though a few years ago it would buy twenty bushels. Therefore, gold is worth roughly only half what it was previously. The price of gold may be determined more closely if we find its average purchasing power of various commodities, weighted according to the relative quantities ordinarily required by an individual.

Gold is not a symbol but a commodity; the idea that it is a substance of intrinsic value, worth what it is exchanged for, is a sound one, as every gold miner knows. Real machinery, supplies, and labor are necessary for its production and, once produced, it is an object of utility and real value—if not comparable in point of necessity with wheat and potatoes, certainly to silver, nickel, lace, paintings. and Venetian glassware, all of which have a well-understood, real exchange value in return for other commodities, whether pork, feathers or lumber. Therefore, the logic and the stability of its immemorial use as a standard commodity for exchange purposes.

To go back, then: Wheat at $2 a bushel means that a bushel of wheat will buy a tenth of an ounce of gold. If it does not mean that, it means nothing. But will it? Try and see, friend miner, farmer, or seller of your own labor. Bring to market your apples and your potatoes or your copper and lead, and ask for the corresponding gold. You will not get it. You will get paper instead; and you cannot exchange this paper for dollars—twenty to an ounce. Some of the paper carries the Government promise so to be exchanged on demand; more of the paper contains no such pledge. If your dollars, then, are not gold dollars, what are they? Nothing. We are on a gold standard; the dollars are gold or nothing. Have they, then, no value? They have indeed. They are the I O U's of a strong and prosperous government—temporarily bankrupt, having out far more paper promises than it can redeem. They are worth the amount they stand for, less a substantial discount due to the fact that they are only promises. This discount varies with the prospect men see of having the commodity, gold, delivered to them—if and when. The more I O U's there are in circulation, and the more they become disproportionate to the Government's present ability to deliver the gold, the greater the discount—the less the barter value of these paper promises.

The United States is not the only nation on a gold basis. England, France, Germany, Russia, and many other countries have the same system, and all have reserves of gold on which they found their paper currency. They promise to pay five, fifty, five hundred gold dollars to one dollar which they actually have to pay with, and the trading discount of this paper varies accordingly. We hear much of prices in Europe, which tell us nothing. Bread is $36 a loaf in Petrograd; clothes are $1,000 a suit in Constantinople. It simply means that the people of Russia and Turkey have not that faith in their governments' promises that we have. But our own faith is not 100 per cent. It would only be that if we could get the gold at once. Do you not think that an ounce and a half of gold would buy more than a loaf of bread in Petrograd? Doubtless it would buy hundreds of loaves and doubtless fifty ounces ($1,000) would buy fifty suits of clothes in Constantinople. If our own paper money were withdrawn, and all available gold was put into circulation, do you suppose you could buy an ounce with ten bushels of potatoes? By no means. Gold is comparatively scarcer than recently. There is less of it, and there are more potatoes than formerly, and according to natural laws of supply and demand, it might cost you forty bushels to buy an ounce of the metal. The fact is that gold is not traded in, but is hoarded by the governments and withdrawn from the market, so that the gold miner cannot trade his product for powder, steel, and bacon; nor is any other commodity standard of exchange substituted for gold; and we buy and sell on a basis of I O U's which grow less and less likely of redemption as their number increases and the supply of the nominal standard exchange commodity decreases, and so are offered more and more cheaply in exchange for real goods like cabbages and coal.

Once we get away from tangible assets as a basis for business, the little golden anchor drags after the balloon of reckless promises to pay, till it clears the ground and mounts higher and higher, with no means of measuring its probable ascent. Under these conditions, prices, here as in Europe, mean nothing; nor with a fluctuating discount which we have no means of quoting accurately, can we tell whether a given thing is dear or cheap, except by comparison with other real commodities. Wages may be doubled, but if the average cost of necessities is more than doubled, wages are lower than formerly. You may give labor any wage it asks: as the prices of necessities will rise accordingly, it makes no difference to labor or to the country, except to such as are tied down to the anchor of the now inactive gold commodity standard by investments in Liberty Bonds or other stable and fixed securities. But such a process of raising wages and prices is confusion itself, and all the rational adjustment between various classes of wage-earners and various kinds

of commodities, according to their relative true value, which came about when they were exchangeable on the basis of a real commodity, vanishes in the effort to adjust prices piecemeal to a great and shifting discount rate.

Europe is truly bankrupt. She has destroyed more wealth than she possesses, and has bought the surplus by promises to pay more than she will have in the form of commodities of any kind (to spare) for a long time. But the United States is rich and prosperous: although she has destroyed much wealth in war, she has produced enormously; she is only gold bankrupt, and, even so, by no means to such a degree as the countries of Europe. But her plight in this respect is getting worse instead of better. As the governments have destroyed the market for gold by hoarding it as theoretical "reserves" for mountainous piles of I O U's, the gold miner cannot, as before stated, trade his gold for other commodities. For his ounce of metal he can get only twenty paper promises, secured mainly by other promises, to pay one dollar each — never; and those whose commodities of timber or quicksilver he must have, require twice as many of these as if they considered them absolutely safe. In other words, gold has been practically demonetized, and no tangible substitute has been provided. The result is that its production is growing less and less, whereas, if it were employed as an actual medium of exchange, it would grow larger and larger, on account of its relative scarcity and greater demand; and, with the dwindling production, the golden anchor to the balloon grows less and less restraining.

Certainly no safe outcome of this solution is indicated without some new move. The gold miners are striving to find a remedy by means of which they may be able to live; the nation, by which it may obtain more gold and so weight its anchor. Secretary McAdoo recognized this and stressed it, in the thick of the war, and gold mining was given the privileges of a necessary war industry.

As one solution, it has been proposed to increase the price of gold from $20.67 per ounce to, say $40 per ounce, to keep pace with the other prices. That is to say apparently, that an ounce of gold shall be worth forty one-fortieths of an ounce of gold; but the plan has this in it, that it recognizes the discounted I O U currency and proposes for an ounce of gold to exchange forty promises to pay one-fortieth of an ounce of gold some day, provided somebody else pays somebody else the said gold, according to their several I O U's; so that the gold market is temporarily pegged somewhere near the current valuation of Uncle Sam's promises. But the pegging will not adjust itself, any more than before, to the fluctuations of the discount rate, and only adds to the confusion, if we are searching not only for the relief of gold mining but for a way to get upon a real commodity basis of exchange. Internationally, it would not help; for the gold miner in Russia, in order that he might resume business, gold would have to be pegged at, say, $6,000 per ounce, and so on.

Another plan proposed is not to meddle with the gold standard, but for the Government to pay the miner temporarily, and while the inflation continues, a corresponding bounty—say $20 per ounce—which relieves the miner as above, giving him his forty discounted promises. This plan seems fair, but we fear it may not be practicable.

The Government must thus give its note without date for double the amount of gold that it receives; it agrees to pay 100 per cent "commission" for the loan, but it is doing that on all other commodities that it purchases, and, of all these, gold is the most valuable permanent asset. But this practice would not help it to reduce inflation nor to progress with its process of paying its obligations. To buy gold at 100 per cent premium for the purpose of paying at par its debts of Liberty Bonds and Treasury notes would be doing a rushing business but not one calculated to increase its financial standing.

The one partial remedy would appear to be to put all gold into circulation; but the governments dare not do this; otherwise they would hold the paper and some one else the gold—they know a good thing, even when they expect their publics not to know how essential it is. The fact is that there is not enough gold for this purpose. Better to keep up the fiction of the validity of the I O U's indefinitely.

If, then, our wealthy and prosperous nation has not enough gold to serve as a current medium of exchange, and if, as seems to be the case, there is no likelihood of having enough, both on account of the discouraged production and the fact that the gold mines of the world are being exhausted, the obvious thing would seem to be to provide some more abundant commodity medium of exchange, whether it be copper or wheat. Silver is obviously the most convenient, already a preferred commodity exchange medium among millions of people. The monetization of silver would, with gold, give the so-called bimetallic system; it would increase the supply of real money, would at once add great weight to the balloon's anchor, and so tend to deflate prices; moreover, it would tend to increase the price (purchasing value) of gold, and so to increase the production of gold, and still further bring down the balloon. In a word, we submit that the monetization of silver would be the most substantial help that can be devised for the gold industry and for the general economic condition of the country.

Such a move is understood to be impending in Europe, where it is even more needed than here, as we have a far larger gold "reserve" than any other country. The loss of this fancied advantage should not worry us, for our great problem, even for our own interest, is to rescue Europe from its present bankruptcy.

The Petroleum Policy of England

PETROLEUM, as is well recognized by students of the subject, is the most important basic factor on which pivots future military and commercial power. In the immediate past the wealth and power of a nation have varied in direct proportion to its

coal and iron resources (granting that it retained control). That was the fundamental truth of the Age of Steam, with the use of coal as the highest form of fuel. Now, however, we are in the first flush of the Age of Gasoline and fuel petroleum, and oil outranks coal in immediate strategic importance. The petroleum resources of the world are mainly under the control of two great powers, both Anglo-Saxon—England and America. The latter predominates at present, because of the vast oil resources which have been discovered within her own boundaries, and because of the organizing genius of her private business concerns. The control of England is growing by leaps and bounds, because of a fixed national policy and, to a considerable degree, of direct government ownership and control.

America has had no government policy regarding oil since the government dissolved the Standard Oil Company. Since then the warfare against great and powerful business combinations has been neglected, but nothing new has been developed. England, on the other hand, has frankly adopted the opposite plan, of encouraging and even forming great oil monopolies, under government auspices. The power of this organized efficiency, with the great strength of the British government behind it, as compared with the weakness involved in the negligent policy of America, needs no explanation; and the result is that we must acquiesce in the prediction of various conservative American petroleum experts that before long the preponderant control of the world's petroleum, and with it the military and commercial domination of the world, will pass to Great Britain, and that if the United States sits down to the table of equal political and commercial power anywhere in the world, even at home, it will be by favor of England's request only.

These facts have been known for a long time in private as well as government circles; there is no secret about them, and the magnitude of England's official program in this respect is so great that it could not be concealed, even if she so desired.

We presented in our last issue an article written by an author whom we know personally, and who states a few plain facts and inferences as plain.

This British petroleum policy, it was shown, is frankly nationalistic and imperial, and bluntly discriminatory, against the United States in particular and all other powers in general. This is part of a similar nationalistic policy in regard to other minerals, the details of which we shall point out from time to time. Plainly, England desires to profit both by the threat and lesson of Germany. Plainly, she is determined that no other nation, Anglo-Saxon or otherwise, shall again put her into the extreme danger to which carelessness regarding Germany's schemes and methods submitted her. Her solution for the future, as to plan, is to dominate the world, not only by her old device of a twice preponderant fleet, but by political and commercial control of the fundamental mineral resources of the world. Her solution, as to method, is to adopt the efficient German system of state controlled monopolies; and to further safeguard herself by discriminating against non-British investors.

This program was evident during the war, when the nationalistic sentiment was perforce stiffened, as in other countries, by the necessity of strengthening to match the unhealthy German nationalism; and was the cause of much dismay on the part of Americans who found themselves discriminated against by the program. For the United States to have made a strong point and issue of this condition during the war would have been to play into the hands of the Germans, who were endeavoring, without success, to promote the anti-British sentiment, for their own ends. The ultimate American belief in the fairness of Britain and the inevitable common destiny of America and England remained and still remains unshaken; but now that we two, standing together, have conquered the common enemy, it is opportune to have a plain talk as between friends and partners. America must not submit to be put in such a position as to risk being told by England that such a talk is unnecessary, since she has arranged matters with entire satisfaction to herself. There has been and is much talk of American world domination, which is as indiscreet as England's present policy. Partners in the world's wars, peace, and business must not seek to eliminate or dominate one another, but to divide activities, responsibilities, and profits equably.

Meantime, in view of America's sluggishness of insight and action, we can hardly blame England's vigorous and progressive nationalism (we believe it to be fundamentally against the Teuton and not primarily the American), so much as we do America's inactivity; and the firm yet fair method of joining issue with England in regard to her discrimination, in those countries which she controls, against American progress in the ownership and control of petroleum, would be to adopt corresponding retaliatory legislation, thus putting each on an equal footing as business rivals, but making it clear that we prefer that both should abandon selfish and domineering methods, and become true partners instead. In the shoulder to shoulder forward march of America and Britain, we firmly believe, lies the hope of the world; and not less important is the preservation of the dignity, independence, and power of America.

The Chrome Tariff Problem

WE ARE GLAD to publish in this issue an argument by W. P. Lass, a mining engineer interested in chrome mining in Alaska, in favor of an import tariff on chrome ores, as it presents the point of view of many domestic producers.

When our country entered the Great War, unprepared and at a time when Germany's star was in the ascendant, those mining engineers who were serving or advising the Government saw the necessity for an abundant supply of the necessary metals, without which our high-speed production of arms, supplies, munitions, and ships would slacken and the cause of democracy be lost. Heavy as this responsibility lay upon the miners, it lay still more heavily and directly upon those manufacturers of metal and

metal products upon whom the Government directly leaned and upon whom it made most imperative demands. The head of a great steel company frequently observed in conferences: "They say that food will win the war; that this and that will win the war. I tell you it is through steel that we must win the war." That was his battle cry, and that of the Army and Navy—steel, chrome steel, manganese steel, vanadium steel, low-phosphorus steel, in quantity, immediately and continuously.

And the other metals were, and were recognized, as of supreme importance. The Army and Navy must have enough; too much was excellent, but not enough meant disaster. The one thought of all, miner and manufacturer, and Government man of every type (unless there existed traitors, of which there is no evidence), was to drive through a belated attack, which looked almost a forlorn hope, to victory against the Hun. Had Germany conquered Europe, America was preparing to fight her single handed.

To depart from this program, for the protection of this or that industry, at that critical period, would have been stupidity and folly. Sacrifice of life, wealth, and industry was the daily program—not protection; only the protection of humanity in the mass.

When a nation's life's in danger
We've no time to think of men.

Such regulations regarding minerals as were made by the Government, and such legislation as was introduced looking toward a war-mineral control, was simply with the above view, and no other. Certainly no restrictions on imports would have been desired or attempted had there been ships available. But the shortage of shipping, and the necessity for throwing an army into the battle line in France at once, and assuring its supply and support later, meant the forced withdrawal of ships from import trade for transatlantic service; and instead of such a withdrawal without plan, the withdrawal was made at once, under as good a plan as could hastily be drafted and agreed upon, for the exclusion of unnecessary imports, and for the reduction to an agreed program of such necessaries as could, under the stimulus of Government appeal and high prices, be produced in the United States more abundantly than before. In the latter category was chromite.

The formulated program was abundantly justified and successfully carried out in that the dreaded shortage did not materialize; nor would it have done so had the war continued. Domestic production exceeded expectations, although not till the close of the war did it begin to assume proportions approaching the total necessity of war demands. Importations from overseas in New Caledonia and Brazil (little came from Rhodesia) were necessary during the conflict to maintain a safe reserve, and imperative in the beginning of the crisis. Had the German submarine campaign, which dismayed to the point of panic the steel manufacturers by the sinking (as commonly believed) in the Caribbean of a great cargo of Brazilian manganese bound for the United States, expanded and similarly blocked other shipments of manganese and chromite, we should have been, to say the least, in a very unsafe position.

It is true that the program of importation of chromite was prolonged, and exceeded the estimate of those who had been commissioned to work out a schedule, and this contributed to the surplus which began to accumulate, which was added to by the domestic production being so far in excess of the most optimistic estimates made by the producers or the Government engineers, and further greatly increased by the campaign of economy in the use of chromium in steel making, demanded by the Government, and loyally carried out by the steel manufacturers; and in this element of importation the program announced to the miners as one on which they could count in their plans was departed from, due to the lack of sufficiently close co-operation between war committees and war boards in the intense drive of war activity. In war time this jar in the machinery was of minor importance beside the fact that the net results were an abundance of the metallic sinews of war; and would have been adjusted by special war remedies had the conflict continued.

With the war victoriously concluded, however, the time comes for readjustment and repair. The dead have been buried, the crippled sent to their homes with their trifles of insurance money; the homes of France will one day be rebuilt, and the mines of Belgium will eventually be unwatered. Unhappy should be the American who cannot count sacrifices made for what has been attained, and most happy is he if he has not received cash in full compensation. What of the host of volunteers and no less eager drafted men who forfeited their business and their acquired positions, to dodge shrapnel at $30 per month? Do not worry about them. They have been paid in full (such as came back), although minus a limb or so, gay young d'Artagnans of the air, land or sea; stanch doughboys or graying resolute older men; and their message is that they will do it again if necessary. But the discharge of commercial debts and obligations legally contracted, or morally incurred, by the Government, is apparently not a difficult thing; and for this reason we have supported the plan to compensate chrome miners for their losses, for the reason that the strict letter of the assurances made to them by their government was not kept, and because they have, in many cases, suffered cash losses thereby.

So much for the past. We have only referred to it because it rankles so persistently and is viewed so disproportionately in discussion, of the present and the future, and because bitter feeling concerning it has been fanned by an uninformed and sensation-seeking press. The only constitutional method of discharging the debt of honor to the miner lay in Congress, which passed a bill that, under the back-and-forth battering of many views, emerged in a form so restricted as not to present an equitable and uniform remedy, but which must be administered as directed. So much for the present.

The question of the tariff is the question of the future, and should not be linked sentimentally with

the past. It is now proper, as the nation has been saved, for classes, industries, and individuals to consider their needs, advance their welfare, and argue for a recognition of their rights. Various domestic industries accordingly demanded protection from foreign competition through a tariff, following a well-established American principle. Among those asked for is the tariff on chrome, arguments in favor of which are presented by Mr. Lass. We should like to receive contributions of further discussions of this vital question, and from various points of view; and at a later time should like to make further comment.

Control of Spanish Potash

THE Spanish potash deposits, which were recently visited by Hoyt S. Gale, of the U. S. Geological Survey, and described by him in this issue, are of considerable interest to Americans. The prewar German potash monopoly was held by the Germans to be one of their lasting assets, and a club to reduce refractory nations like America to submission and to force an exchange of raw materials like copper and cotton, which Germany needs. For America, looking forward during the war to the post-war period, relief from this monopoly was sought in the development of our own potash-producing industries, mainly as byproducts; but there was also taken into consideration the little-known deposits of Spain. The defeat of Germany and the acquisition by France of Alsace, broke up the German monopoly, however, so that we may now buy either from France or Germany. The development of Spanish deposits opens up a new field.

The strategic control of these Spanish deposits is of special interest to us. The Spanish government, as stated by Mr. Gale, has provided that the mines shall be grouped in a syndicate, in which the government shall own a share and have a voice—in other words, a state-controlled monopoly, patterned after the German Potash Syndicate. The law further specifies that the domestic prices shall be less than the export prices and that the government shall fix the maximum domestic price and the minimum price for the exported article; also that it shall fix the approximate output of each mine. Potash lands may be held for operation by the government, and all mining concessions are under supervisory control of the government.

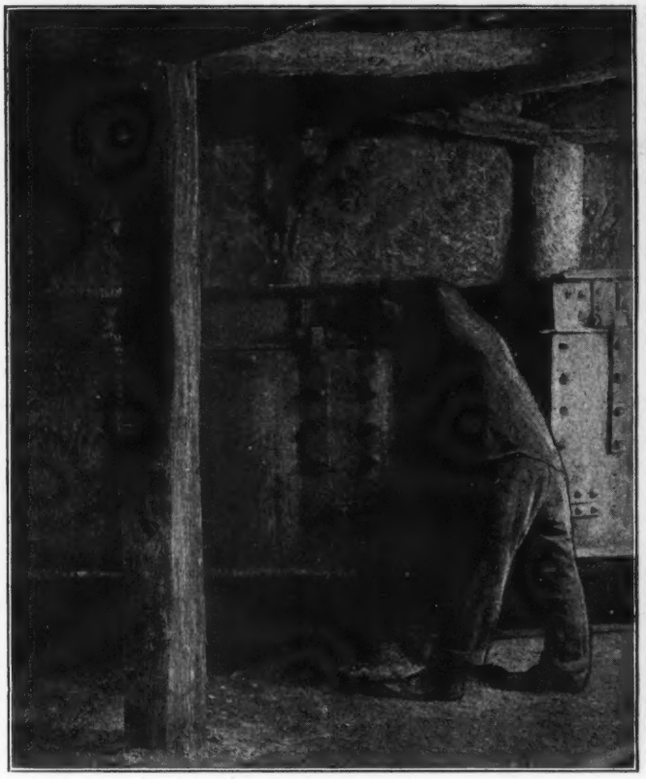
Mr. Gale enumerates the principal owners of concessions. They include a Franco-Belgian syndicate, a Spanish chemical company with German affiliations, a Spanish-French chemical company, a German company allied to the German Potash Syndicate, and an American company. This is another instance of the adoption of the German system of state-controlled monopolies for strategic economic power for nationalistic purposes, which we have previously pointed out in the statement of the British petroleum policy. The Spanish program nullifies any attempt at commercial control by aliens, discriminating between foreign and domestic purchasers in favor of the latter, in order to give economic advantage to Spain through a protective export tariff; and prevents competition between producing companies unless through political intrigue and favoritism. There would appear to be little attraction for American capital in this field.

The great business combination was the result of American inventiveness. Disowned in the land of its birth, it was adopted by the German state with that Teutonic faculty for utilizing the inventions of other nations, and was used as a means of strengthening an offensive and defensive nationalism. Demonstration of the centralized effectiveness gained thereby has been well noted by various nations, whose policies as regards mineral supplies as well as other resources it is worth our while to observe and consider. There is the germ of much international politics in such arrangements as this Spanish potash syndicate. Secret rebates to favored nations could easily be arranged. We can easily conceive, in view of Spain's unsatisfactory war record, secret understandings between the potash syndicates of Germany and of Spain in regard to the country that will probably be the chief customer, the United States. The organization of the French potash industry will be looked forward to with interest. It is for the benefit of France, and indirectly of the United States, that the latter should, under present economic conditions, purchase from France as much potash as possible, and France should not adopt the Spanish plan of charging a special price to us.

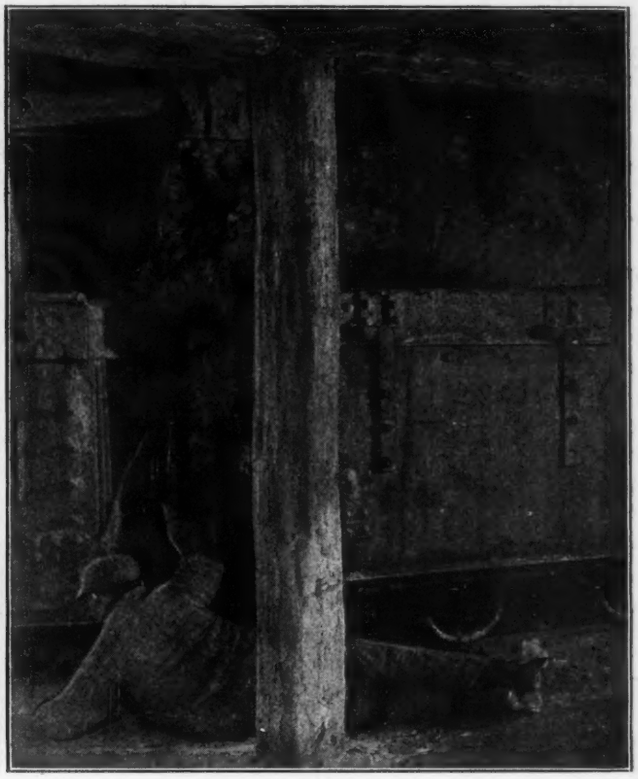
The 1918 Price of Copper, Compared With Its Cost

WE PUBLISH on another page a summary of the report of the Federal Trade Commission which assisted the Price-Fixing Committee of the War Industries Board in determining a fair price at which copper should be sold during the war. The report contains several interesting tables, some of which we reprint.

The price of copper for the year 1918 was 24.7c., and the average cost, as determined by the commission, was a trifle over 16c. The profit was therefore about 8.5c. per lb. As 85 per cent of the copper sold was produced for less than 20c. per lb., a certain amount of criticism, largely for political effect, has been directed at the Government price-fixing board for setting the price at too high a figure. The fact must be kept in mind, however, that the Government fixed price, which became effective Sept. 21, 1917, was over 7c. less than the average market price which had prevailed during the preceding nine months. Moreover, had the price been set at, let us say, 21c. per lb., 39 of the 85 companies, or 46 per cent, would have operated at a loss, and many would have been compelled to suspend operations. Yet these 39 companies produced only 14 per cent of the total copper. With the exception of some of the Michigan companies whose orebodies do not justify the investment, they are the younger properties still in the course of development. The Government happily did not set the price so low as to kill off the children of the industry.



Uncoupling while train is still moving

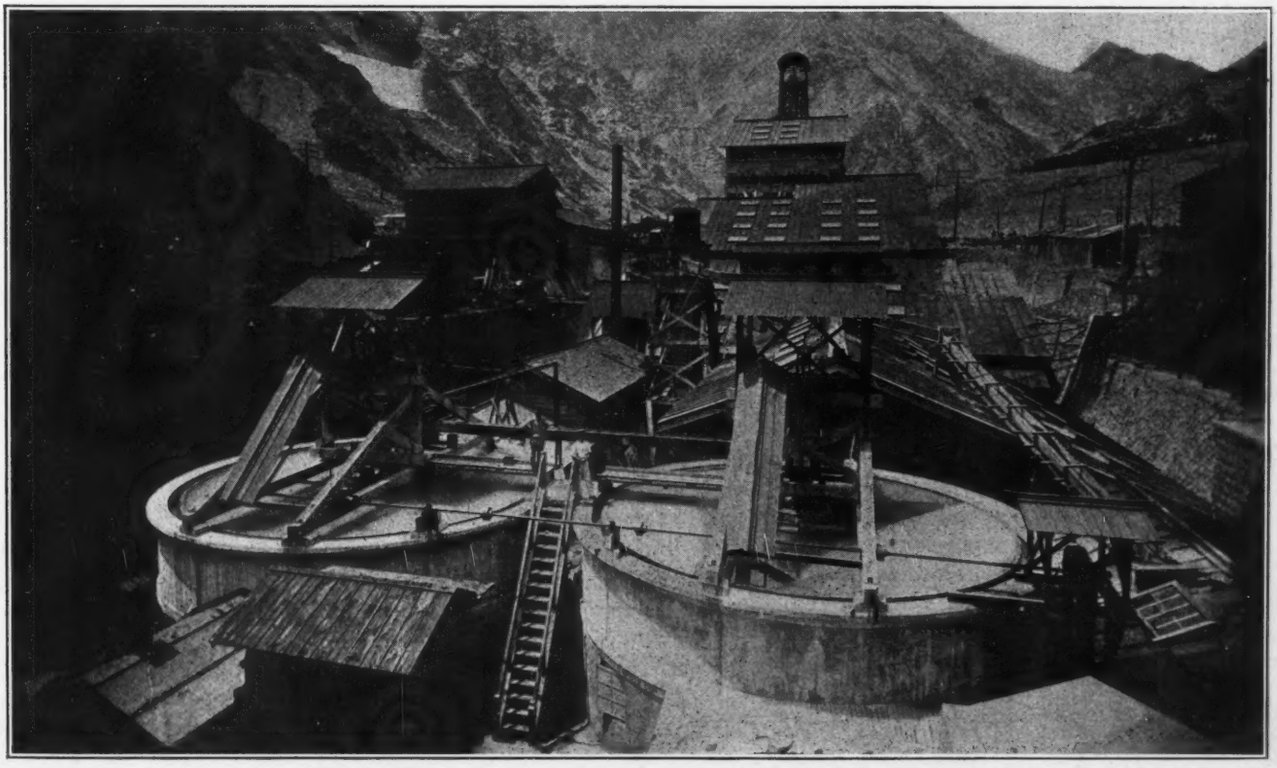


Result: Brakeman thrown against timber

UNCOUPLING MOVING CARS IS DANGEROUS PRACTICE
(By courtesy of National Safety Council)

Photographs From the Field

VIEW OF THE HONZAN CONCENTRATOR, ASHIO MINES, JAPAN, SHOWING TWO DORR THICKENERS IN FOREGROUND



Potash Deposits in Spain *

Extensive Salt Basin, the "Salina de Cardona," a Possible Source of Chloride of Potassium—Government Restrictions and Details of Plans for Development Now in Process of Execution

BY HOYT S. GALE

THE announcement of the discovery of potash in deposits in the Province of Barcelona, in Catalonia, in the northeast corner of Spain, appeared in print in 1913 with the publication of the first of two excellent reports on the subject by engineers of the Institute geologico de Espana.[1] There has been much discussion of the salt deposits of the region, which have long attracted attention as showing remarkable features. The potash associated with these salt deposits was recognized in 1912, and then only by accident, as a result of development to enlarge the production of salt.

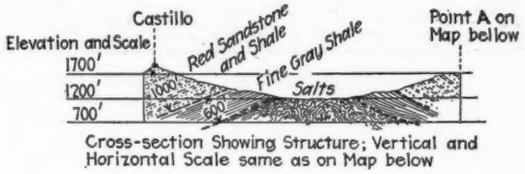
The Spanish potash field, as now defined, lies northwest of Barcelona. The area is about seventy-five miles long, and forms a practically continuous

FIG. 1. INDEX MAP OF SPAIN, SHOWING THE SITUATION OF THE POTASH DEPOSITS OF CATALONIA.

belt, with a maximum width of fifteen to eighteen miles. The general situation of the field is represented on the accompanying index map (Fig. 1).

The principal discoveries of potash have been made in the immediate vicinity of the villages of Cardona and Suria. Both lie in the valley of Cardoner River and are reached by motor omnibus or "diligence" over an ordinary country road following the river. Manresa is forty miles by rail from Barcelona, and train service is frequent and fairly satisfactory. Suria is nine miles and Cardona about twenty miles north of Manresa. A branch railway is now under construction from Manresa to Suria, put in primarily on account of the potash developments now going on at Suria.

A large area of concessions has already been ceded to private claimants by the Spanish government. After the first rush to appropriate these mineral lands, restriction was put on the granting of further rights. A tract reserved by the state includes a total area of about 1,800 square miles. Much of this tract is undoubtedly not potash-bearing, but it includes in a general way the formations similar to those containing the salts at Cardona and Suria, and is a provisionally outlined field reserved for further exploration. An area of 350 to 400 square miles is outlined in the map of concessions already granted.



Cross-section Showing Structure; Vertical and Horizontal Scale same as on Map below

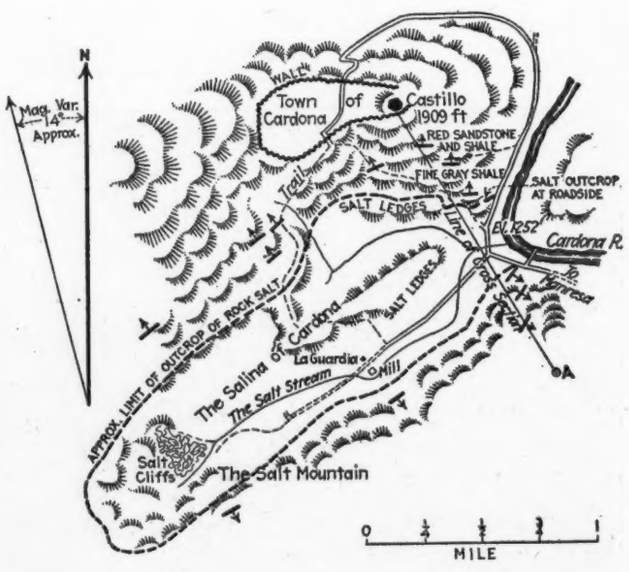


FIG. 2. SKETCH OF THE "SALINAS DE CARDONA."

Private interests or foreign governments are invited to participate in the development or operation of the field, under specific regulations of the state and local governments as to the manner and regularity of operation and the price and distribution of the product. This phase of the subject is discussed at greater length in the section entitled "Spanish Legislation."

*Abstracted from a forthcoming paper of the U. S. Geological Survey.

[1]Rubio, Cesar, and Marin, Agustin, "Sales potasicas en Cataluna": Inst. geol. Espana Bol., Vol. 34, pp. 173-230, 1913; "Sales potasicas de Cataluna"; Idem, Vol. 39, pp. 1-38, 1918.

The principal owners of concessions in the Spanish potash field are as follows:

Solvay & Cie., 33 Rue du Prince Albert, Brussels, Belgium. This is the well-known Franco-Belgian syndicate, which already operates in Spain in the subsidiary soda works at Santander.

La Sociedad Fodina, which has engaged in exploring concessions ceded to Francisco Ripoli and Ignacio

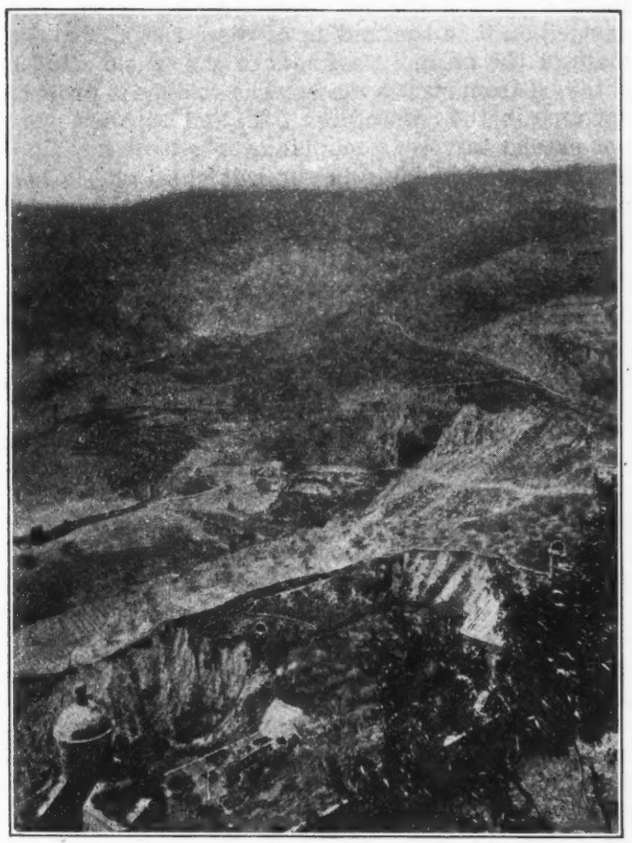


FIG. 3. VIEW OF LA MONTANA DE SAL AT CARDONA

Marinello, of Barcelona. This concern is understood to be a subsidiary of or closely allied to the Sociedad Electro-Quimica de Flix, Calle de la Princesa 21, Barcelona. The last-named company is listed as a manufacturer of caustic and industrial chemical products, presumably fertilizer materials, and is said to have strong German affiliations.

La Sociedad General de Industria y Comercio, a Spanish and French company, with headquarters at Villanueva 11, Madrid. This company is engaged in the manufacture of fertilizers, explosives, and other chemical products, and has plants at Bilboa, Barcelona, and in other parts of Spain.

La Compania de la Salina de Cardona, the old salt company that has been mining and shipping rock salt for many years from the celebrated salt mountain of Cardona. The property belongs to the Duque de Tarifa. The local administrador is Juan Ratera Cendra, at Cardona.

La Minera, a German organization, is reported to be a subsidiary of one of the potash companies in Germany, and therefore allied to the German Kalisyndikat. La Minera controls an extensive area of concessions in various parts of the Spanish field.

The American Agricultural Chemical Co., 92 State St., Boston, Mass., holds concessions in the name of Roberto Sturz Bradley. Two properties called the Filadelfia and the Boston cover territory adjacent to or intermediate between areas in which the recorded discoveries of potash salts have been made.

Besides those named above there are other less extensive holdings, listed under the names of Juan Vives, Rene Paulus, and Demetrio Castellana Moreno, and there are also some concessions originally held for coal that may include potash.

"La montana de sal de Cardona," described by Calderon[2] as a veritable mountain of salt eighty meters high and four kilometers in circumference, shown in Fig. 3, has been one of the renowned natural features of Catalonia since a very early date. Baedeker says that this phenomenon is mentioned by Strabo, quoting a reference to Book III of his geographical works. The mining of salt from the Cardona deposit is an old industry and is still carried

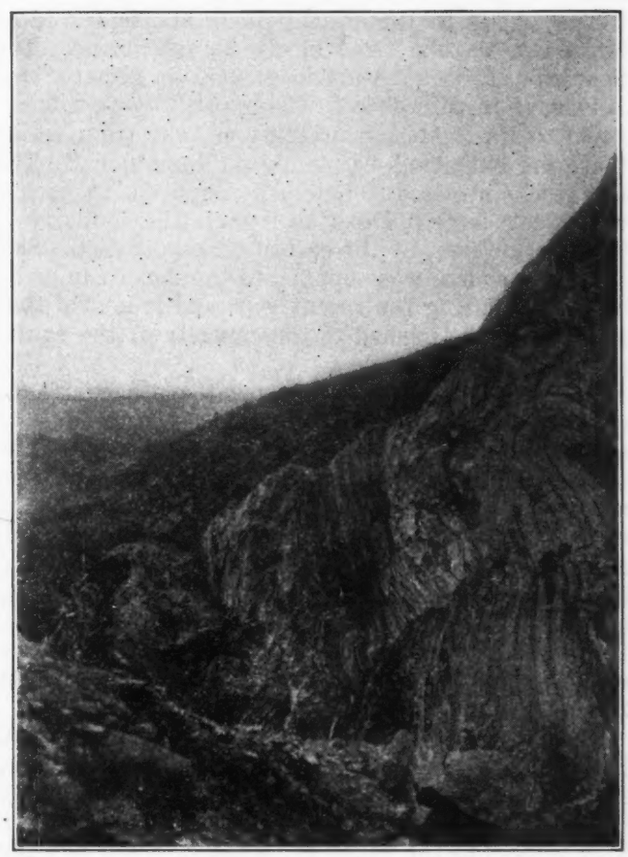


FIG. 4. OUTCROP OF SALT AND THE OVERLYING SHALES AND GYPSUM.

on, both for local consumption and for export. The title to this property is apparently a local hereditary right, having recently passed from the Duque de Medinacelli to the Duque de Tarifa.

Cardona is an old fortified town perched on the summit of an almost isolated hill in a bend of Cardoner River, 600 feet above the river level. The town

[2]"Los minerales de Espana," Vol. 1, p. 385, 1910.

is surrounded by a wall and dominated at the very summit by an interesting old castle. In clear weather there is a wonderful view from the castle, with Cardoner River stretching away in either direction in the foreground, and, beyond it, to the north, the distant snow-capped peaks of the Pyrenees. To the south and southwest the town overlooks, at the very foot of the hill on which it is situated, a peculiar depression which is the salt basin, the "salina de Cardona." At the farther end of this basin is a great whitish-looking scar lying against the mountain side, and this is the famous mountain of salt. It is a great natural outcrop of rock salt which occurs as an interstratified part of the sedimentary rock section. It is brought to the surface along the crest of a distinct anticlinal fold, the structure of which is perfectly evident in the dip and stratification of the series of sandstones and shales which overlie it and whose outcrops encircle the basin in regular form. Smaller exposures of rock salt occur at many places in the bottom or on the lower slopes of the basin. Just at the foot of the hill below the castle is a large funnel-shaped sink hole.

The salt is mined in solid form and is sawed or hewn into regular-sized blocks for shipment. The Spanish yearbook "Anuario general de Espana" for 1917 says in reference to Cardona: "It owes its renown to its famous mountains of salt, from which there are extracted 40,000 quintals annually." The salt blocks are said to be chiefly exported to Africa, where salt is prized in this form. The industry is limited, however, by the cost of transportation. Salt from this source was supplied to the American army in France during the recent war, and it is said that production was pushed to the capacity of the equipment.

The upper layers of the deposit are a composite of relatively thin bands of variously colored salts and interstratified layers of gypsum and clay. These upper salt layers appear in a strangely contorted mass. Under them there is a great compact mass of white transparent salt, which is very pure. According to report, the mining was formerly done in a large open pit, the salt being cut in steps or terraces, but now it is obtained by underground methods. The workings have a depth of fifty meters, and the whole depth, it is claimed, is cut in solid salt without the intercalation of any other substance.

The accompanying sketch map, Fig. 2, I prepared from a pocket-compass traverse made at the time of my visit. It shows the general outline of the outcrop of the salt and the situation of the basin with respect to the valley of Cardoner River and the town of Cardona.

The salt basin is the eroded axis of a well-defined anticline. Apparently the massive rock salt is the lowest member of the section exposed by erosion and solution along the axis of this fold.

The view in Fig. 4 shows the outcrops of salt and the overlying shales and gypsum in the bluff at the base of the hill below the castle, at the outlet to the salt basin. The stratigraphic section exposed in the bluff below the castle is represented in the cross-section attached to the sketch map of the salt basin. By rough computation from the data obtained in making the sketch map, the section exposed here totals about 1,800 feet of stratigraphic thickness, but the thickness can be obtained much more accurately with more careful measurements.

Little seems to be known about the total thickness of the salt beds. The cliff at the head of the salt basin is made up of banded salts in a strangely contorted mass. This contortion illustrates the plasticity of salt under such compression as has been exerted on it in the folding of these rocks. No estimate of the normal thickness of the whole could be obtained from such a mass. The folding is probably extreme in the axis of the fold, and possibly would not extend far on either flank. Fig. 5 is a view of the contorted bedding in the salt cliffs at the head of the salt basin.

Extent of Potash Occurrence Uncertain

The evidence of the existence of potash in the Cardona deposit is not very definite. This may be because of lack of adequate investigation at this locality, or the potash may not be present in large amount in this part of the field. As has been said, this exposure gives one of the most favorable opportunities in the field for observation of the general relations of the salt and the overlying beds. It is geologically an epitome of the Spanish field, whether the potash is found in commercial quantity at this locality or not.

Rubio, in his report, already referred to, quotes some analyses of samples from both red and white specimens from the Cardona deposit, which show the existence of pure chloride of potassium at this locality. He states, however, that these were found only in a small area, and it was said locally that the potash had so far been found only in thin seams in this deposit. Analysis of the salts in solution in the little brine stream that flows from the big salt cliff is stated to have shown 81.65 grams of potassium chloride per liter of the solution. This seems to be saturation with respect to potassium chloride, but in any solution this depends on the amount and nature of the other salts present, particularly magnesium chloride, the amount of which is not stated in this analysis. The amount of the potash indicated is high in any case. The value and workability of the potash beds in the Cardona region is therefore still problematical, but there is an excellent prospect at this locality that seems worthy of exploration.

Potash Prospects at Suria

The discovery of potash in the Spanish field was first made at Suria in 1912, by accident. In attempting to open a mine for common salt, at a site where there had been some ancient salt workings, Macary & Viader sunk some borings and a shaft that revealed the potash salts, and it appears that these were soon recognized as potash. An investigation carried out in 1913-14 by a French association resulted in the application for and granting of a concession near the village of Suria, which concession was later enlarged, and concessions in other parts of the field were added to it. This group combined

interest with the Belgian Solvay Co., and the subsequent explorations in the field have been conducted by the Solvay Co., principally in the immediate vicinity of Suria. The discoveries at Suria, of which there are now available only the records of the old shaft sunk for salt, and the borings sunk on the Solvay Co.'s concessions, constitute about the only evidence of the existence of potash in quantity in the Spanish field. These holes have been filled and carefully sealed to prevent damage to the deposit by water, and no new evidence is to be had from them. The records available have been published in the reports of Rubio and Marin already referred to. There is no doubt that the existence of potash in considerable masses has been demonstrated.

An old shaft, sunk at the edge of the river-bottom lands, has now been supplemented by about fifteen borings, mostly in the immediate vicinity of Suria, and nearly all of these are reported to have shown sylvinite and carnallite in fairly regular beds, so that in the main these beds could be correlated from place to place. The contorted beds, it is said, are confined to the axes of the folds. There are in general two beds of carnallite and a lower bed, in some places two, of sylvinite. The carnallite zone, containing workable beds three meters or more in thickness, averages 12 per cent potash (K_2O) as shown by taking a weighted average from the core samples so as to represent all the material removed from the section indicated. The sylvinite, in beds of two meters or more in thickness, is reported as averaging at least 20 per cent potash, and certain portions containing much purer material were found. Tonnage estimates of the reserve supply in the concession at Suria have been based on the evidence that is here summarized. The evidence was deemed sufficiently good to justify a company with a reputation for competence and conservatism in proceeding with some rather extensive plans for actual commercial operation in its property.

Standard Mining Shaft Put Down and Plant Erected

At the time of my visit, in May, 1919, a standard mining shaft, which was begun in April, 1918, had reached a depth of about sixty meters. Permanent foundations for a refining plant and substantial dwellings and offices for staff and employees were also being erected. The shaft had not yet reached the depth at which it was expected to encounter the potash, but water was flowing from a zone at about the level of the river, and the work going on at the time consisted chiefly in the attempt to seal this out. The new shaft at Suria is about 1,500 ft. from the old shaft. It lies in approximately the same stratigraphic position as the old working, and probably encounters a similar geologic section, with some variation in detail.

The area at Suria considered as proved by these prospects is about 3,500 hectares (75,145 acres), which, according to optimistic reports of interested engineers, establishes the existence of potash-bearing strata of an aggregate thickness of 80 to 200 meters, having a potential production of 200,000,000 tons of pure potash (K_2O).

Aside from the two localities at Suria and Cardona, which are only seven or eight miles apart in an air line, the field covered by concessions reaches about thirty miles to the east and forty-five miles to the west, the locations being based rather on the extension of similar geologic formations, with some evidence of salt, gypsum, and the shales associated with the salt, than on specific discoveries of the potash. A good deal of boring has already been done throughout this area, mostly with essentially negative results, but a few more positive indications have been found. The principal evidence of the existence of potash outside the valley of Cardoner River is at Villanueva de la Aguda, a village situated near a locally well-known brine spring a little over twenty miles west of Cardona. The brine is reported to carry 4.1 gm. of potassium chloride per liter, which

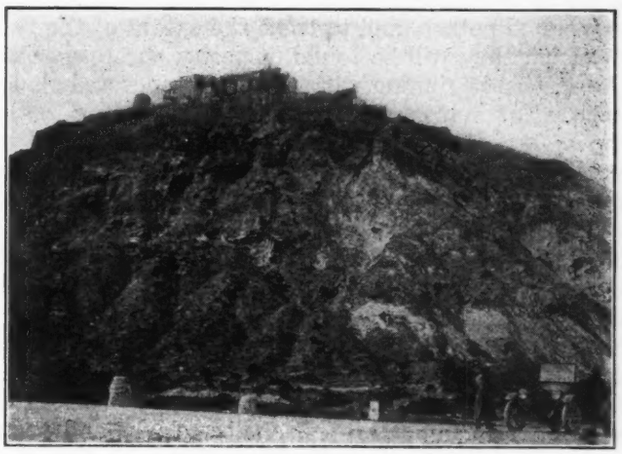


FIG. 5. CONTORTED BEDDING IN THE SALT CLIFFS.

is not necessarily an exceptional indication. However, a boring put down by La Sociedad Fodina is reported to have cut two layers of potash salts, the first at a depth of 303 meters and the second at 654 meters. The boring was continued to a depth of 737 meters, and was discontinued while still penetrating massive salt. The information as to the thickness or character of the potash seems to be rather meager. Many of the borings have shown the extension of the massive rock-salt deposits or of gypsum and salt mixed, and there is always the possibility that the record is incomplete through failing to reach sufficient depth or for other reasons.

General Geology of the Field

An extensive basin of Tertiary sediments in northeastern Spain is limited on the north by the east-west axis of the Pyrenees Mountains, which is a well-defined anticlinal fold exposing the Paleozoic rocks, gneisses, and granitic rocks along its crest. This great low area extends eastward from the valley of Ebro River, and is sharply delimited on the south by the coast ranges of Catalonia.

From the conditions present it seems probable that during some portion of earlier Tertiary time in this region the Ebro basin may have been occupied either by a continental sea or by a great gulf with narrow passages connecting it with the ocean. According

to the observations of European geologists, the uplifting of the great anticlinal folds that give rise to the Pyrenees Mountains began in the Eocene but took place principally in Oligocene time. Thick salt and gypsum deposits are found among the sediments laid down in this basin during Eocene and Oligocene time. Thus the earth movements gave rise to inclosed areas where the evaporation of saline waters left thick deposits of crystallized salts, and in at least some parts of these areas this process was continued to a stage at which the potash and magnesian residues of the mother liquor brines were also crystallized. The historical record seems fairly clear in its major aspects. The section of Tertiary rocks, which is well exhibited, includes near its base a great mass of thick-bedded sandstones and conglomerates with interbedded shales.

To identify the position of the salt beds and the associated potash, and to trace the extent of the field in which they will be found, it seems necessary that the section beginning with the sandstones and shales exposed at Manresa as a base and extending to the top of the series represented in the field should be studied in detail. These Tertiary rocks are made conspicuous by a prevailing deep-red color in the weathered surfaces, so that the series superficially resembles the so-called red beds of the Triassic or Permo-Triassic of the United States. Aside from the general similarity of the rocks and their manner of exposure, both periods were characterized by the deposition of salts and gypsum. The salt, including the potash, occurs rather low in a complex series of sandstones, conglomerates, shales, clays, and some limestone and gypsum. A more favorable field for the study of both structure and stratigraphy is seldom found.

Although there appears to be little information about the total thickness of the beds overlying the salts, it seems likely that this section is thick enough to bury the salts deeply in a great part of the Tertiary basin. In at least the two places, however, that have been described folds have brought the salts to the surface along the Cardoner River channel, and the salts are relatively shallow in many other parts of the field.

Spanish Legislation Concerning the Potash Lands

Soon after the general announcement of the discovery of potash in Catalonia, efforts were made to put through special legislation concerning these deposits. This was in principle a perfectly natural and appropriate step, as applications for extensive areas and rights of a class without precedent in the country would naturally require special consideration.

In 1915, a bill was presented to the Cortes, the national legislature of Spain, by the Minister of Public Works. This bill seemed to place such restrictions on ownership, development, and operations that it aroused protest, and apparently was not passed. It was replaced, however, by a royal order dated June 10, 1915, which was in harmony with the general provisions of the bill still pending. It provided that the concessionnaires in the potash field must work uninterruptedly either in exploration or by mining. According to this order, if regular production had been established under it the concessionnaires would have been obliged to reserve for consumption in Spain such part of the potash recovered as the government might require.

Another royal decree, published on Oct. 1, 1914, permitted the Spanish government to reserve the right of private concession in the potash field until investigations by the technical departments of the government had been carried out. This also granted a right for permanent withholding of land in the field for operation by the government, if that should seem desirable. Rewards for further discoveries of value in this field were offered.

These orders remained in force until increasing activity in the developments at Suria during the early part of 1918 again attracted attention to the subject, and on May 2, 1918, another potash bill was published in the "Gaceta de Madrid." This contained much of the original bill of 1915, including the obligation on the part of concessionnaires to continuous operation, protective measures in favor of internal consumption of potash, a provision that export prices for the potash produced shall be greater than the domestic, and annual regulation of the maximum price for the home market and the minimum price for export. The government is also directed to fix the maximum and minimum annual output of each mine. The Spanish government assumes supervisory control of all mining concessions granted or to be granted, and work on such properties must be under the supervision of the mining inspector of the district in which the concessions are situated. Provision is made that the government shall own a share in a syndicate of owners of the mines and shall have a voice in the administration of this syndicate—regulations evidently patterned after those of the German Kalisyndikat.

Quotations from royal order dated Dec. 14, 1918, state that conditions have been specified under which foreign and Spanish companies can compete for concessions to work the potash deposits.

The restrictions placed by the acts of the Spanish government have undoubtedly impeded progress in the development of the field, and the price-fixing feature of the present act must prove a deterrent to foreign capitalists desiring to enter the field. It is of course fair that Spain should safeguard her own interests, as, for instance, in providing against passing the ownership of these properties too largely into foreign hands and in insuring preferential treatment for domestic potash requirements from these deposits. However, assurance is needed that the conditions under which developments in the field are undertaken will be stable.

Prospects for Production

Production of potash for commercial use from the Spanish field is not expected during 1919, and, even with good fortune attending the work now going on, it seems unlikely that potash will be shipped from

these deposits before the middle of 1920 at the earliest. It is still too early to estimate with much confidence what the future of the Spanish field as a factor in the world production of potash will be. The prospects of production to meet Spanish needs seem promising, particularly as the lower grades of crude salts that may be obtained at first may be available locally before it may be possible to carry out the refining processes successfully.

Statements estimating tonnage reserves are accepted with considerable reservation, until some verification is obtained from underground development by mining. Well records in regions of such structural complications as are exhibited in these salt deposits must be very difficult of interpretation, and the thicknesses recorded for the potash beds encountered must be largely dependent upon the angle at which these beds are penetrated, which is often not determinable. It appears that the more regular parts of the deposits, if such exist, have not been explored.

For the reasons stated above, it still seems necessary to reserve judgment as to the magnitude or importance of the Spanish potash field. The prospects are excellent, and the development now going on should settle the matter in a practical way very soon. Although there is abundant potash in both the German and Alsatian potash fields, and in other possible sources to supply the world's needs for as long as there is now need of estimating, it is far to be preferred that the world should be supplied from numerous and abundant sources than that there should be any danger of monopolizing this resource. Further news of the success attending the development of this field is to be awaited with interest.

Caisson Alluvial Diamond Recovery*

New Plant, Designed for the Purpose of Recovering Diamonds From Vaal River, Provides Diving Bell with Tubular Shaft and Air Lock

AN INVENTION of Fabian M. Cox, consisting of a pontoon with a caisson attached, is expected to solve the problem of recovering diamonds from the deep pools of the Vaal. Briefly, the plant comprises two pontoons, rigidly connected by decks, between which a roomy caisson or diving bell is sunk to the river bed. The caisson is connected by means of a tubular shaft to a chamber above the water level, and the whole is air locked. In order to keep the caisson submerged, it is weighted with heavy iron ballast, and the upper chamber, above the water level, is similarly weighted by an outer concentric chamber or tank filled with water, which can be regulated as to quantity and adjusted to carry the necessary weight.

Compressed air is forced into the interior of the upper, or air-lock chamber, the shaft and the bell, or caisson, and the river water being thus forced out below it is possible to carry on digging and loading operations conveniently. The gravel is hoisted up the shaft and delivered into a chute which holds about a ton. When filled, it is discharged by a mechanism of double doors, which prevents the escape of compressed air from the interior of the various caisson compartments. Safety is provided by means of the free communication of the bell with the upper or air-lock chamber through the shaft and ladderway and by an easily opened manhole above.

The following notes are taken from the provisional patent specification: The present invention has reference to caissons or diving bells of the air-lock type, and in this instance is designed for the recovery of gold or precious stones from deep waters. The invention consists of providing a diving bell having a tubular shaft and air lock with means of quick vertical adjustment through the agency of solid and liquid ballast and suitable guiding frame, and means of elevating minerals by (a) submerged pump, or (b) suitable hoist.

Apparatus Involves Diving-Bell Principle

The following is a description of apparatus constructed according to this invention, and in this instance it is presumed to be for purposes of diamond recovery: A metal cylinder or bell, having a dome roof which is surmounted with a tubular shaft in sections to suit the depth of water to be worked, is terminated by an air-lock chamber surrounded by a water-ballast tank. The dome roof of the bell is provided with means of securing and at will releasing a quantity of solid ballast. The tubular shaft is furnished with external runners, which engage in rollers or guides attached to the deck of a pontoon or raft, which carries an engine, air compressor, and centrifugal pump, and possibly a plant for the treatment of the gravel or material recovered. The air-lock chamber is provided with the usual manhole door and equalizing valve, together with an air-lock chute for discharging gravel, a special door closing the entrance to the tubular shaft, which latter is furnished with ladder rungs and runners for skipway, operated by a hoist fixed in the air-lock. The base of the shaft where it enters the bell is fitted with an air-tight door, which may be used when it is necessary to lengthen the shaft. The bell is provided with collapsible seats attached to the wall for the accommodation of workers during lifting operations, and with a centrifugal pump or hydro-ejector having a flexible suction, by means of which the loosened gravel is deposited in the kibble or skip hoisted to the air lock or elevated direct above water level to the deck of the pontoon.

Bell Submerged and Held on River Bottom

Sufficient solid ballast, partly to submerge the bell, is placed on the dome roof; water ballast is then pumped into the tank surrounding the air lock in order to sink it and hold it securely on the river bed or sea bottom, and the gravel is elevated to the surface by pump or ejector direct, or hoisted to the air lock and thence discharged through the air-lock chute projecting through the water-ballast tank.

* From the S. A. Mining and Engineering Journal, Sept. 6, 1919.

Copper Costs Average 16c.

Federal Trade Commission Publishes Results of An Investigation of the Books of 85 Domestic and Foreign Companies for Year 1918

THE Federal Trade Commission has published a report on the cost of producing copper in 1918 which covers 85 companies, responsible for 95½ per cent of the total copper production in the United States, 94 per cent of that in Chile, 71 per cent of that in Peru, 58 per cent of that in Mexico, 50 per cent of that in Canada and 20 per cent of the copper production of Cuba.

TABLE I. QUANTITIES OF COPPER PRODUCED IN 1918 AT DIFFERENT RATES OF COST PER POUND

Item (a)	Number of Companies	Production 1918	Per Cent of Total	Accumulated Per Cent
Cost less than 12 c	2	122,245,051	5.4	5
Cost between 12 and 13 c	4	208,571,191	9.2	14
Cost between 13 and 14 c	4	314,553,177	13.9	28
Cost between 14 and 15 c	4	359,617,743	15.9	44
Cost between 15 and 16 c	2	98,307,293	4.3	48
Cost between 16 and 17 c	8	460,528,645	20.3	69
Cost between 17 and 18 c	9	255,399,696	11.3	80
Cost between 18 and 19 c	3	72,373,388	3.2	83
Cost between 19 and 20 c	5	28,491,436	1.2	85
Cost between 20 and 21 c	5	36,871,193	1.6	86
Cost between 21 and 22 c	9	135,538,602	6.0	92
Cost between 22 and 23 c	3	60,861,465	2.7	95
Cost between 23 and 24 c	5	44,919,772	1.9	97
Cost between 24 and 25 c	1	6,230,694	.2	97
Cost between 25 and 26 c	3	7,605,224	.3	97
Cost over 26 c	18	46,119,555	2.0	100
Total all companies reporting	85	2,258,234,125	100.0	...
Approximate pounds duplicated	..	63,700,000	.....	...

(a) All costs show fractions of a cent.

The term "cost per pound" is indefinite. As used in this report it represents the cost per pound of copper at the Atlantic seaboard and includes all items of expenditure for labor, materials, supplies, and overhead, but not interest or income and excess-profits taxes. Depreciation on plant and equipment are included as well as a charge for depletion of orebodies. Up to the year 1917, few companies reported depletion as a cost, whereas practically all companies now include such a charge, based on the valuation of their mineral land. This is one of the largest single factors accounting for the apparently large increase in the cost of producing copper in the last year or two.

The commission had considerable trouble in calculating costs on a uniform basis. The calculation of the charge for depletion of orebodies, which included a determination of the actual cost of the mineral land, and the quantity of ore in the ground, was particularly difficult.

The cost of the mineral land would appear to be easy to determine, but as interpreted by various companies it may or may not include items amounting to millions of dollars. As an illustration, Company A acquires its land and develops it by stripping the capping from the ore. The cost of this is charged to a deferred asset account, to be charged later to cost as the ore is removed. Company B, instead of charging development to a deferred account, makes the charge against its mineral land account, considering that until the mine is in actual operation, the capitalization of such expenditures is proper.

Development may also be accounted for in two distinct ways. One method, which is generally in use by the porphyry companies, is to set up as a deferred charge the entire cost of developing. This deferred-development account is credited and costs are debited periodically as the ore is removed. The other method, usually practiced by deep mines, is to charge the development to operations at the time incurred. This is often far less acurate than the preceding method, as during the past year or two the shortage of labor has prevented most companies from doing a normal amount of development. If it had been done, the costs of production would have been somewhat higher.

The average cost of producing copper for the 85 companies reporting to the commission was 16c.

TABLE II. WEIGHTED AVERAGE COST OF PRODUCTION OF COPPER BY OPERATIONS AND BY GEOGRAPHICAL DIVISIONS FOR THE YEAR 1918

Operation	Arizona, and New Mexico Cost per lb.	Utah, Nevada, and California Cost per lb.	Montana, Idaho, and Washington Cost per lb.	Michigan Cost per lb.	Other United States Cost per lb.	Mexico, Cuba, and South America Cost per lb.	Canada and Alaska Cost per lb.	All Companies Reporting Cost per lb.
Mining	$0.056	$0.042	$0.108	$0.106	$0.064	$0.055	$0.061	$0.069
Depletion of ore at cost	.006	.005	.012	.005	.003	.007	.009	.007
Purchases of ore	.010	.006	.016	.....	.004	.....	.....	.005
Transportation to reduction plant	.006	.017	.004	.007	.006	.004	.019	.008
Reduction	.052	.078	.051	.045	.109	.069	.055	.058
Transportation to refinery or seaboard	.007	.007	.007	.004	.005	.017	.006	.008
Refining	.011	.012	.012	.001	.011	.006	.013	.010
General and administrative	.008	.008	.004	.007	.017	.013	.010	.008
Selling expense	.001	.001	.....	.....	.001	.004	.002	.001
Credit for precious metals	.014	.012	.042	.002	.024	.023	.016	.017
Total cost	.151	.168	.174	.176	.199	.156	.162	.161

TABLE III. WEIGHTED AVERAGE COST OF PRODUCTION OF COPPER BY ELEMENTS OF EXPENSE AND GEOGRAPHICAL DIVISIONS FOR THE YEAR 1918

Item	Arizona and New Mexico Cost per lb.	Utah, Nevada and California Cost per lb.	Montana, Idaho, and Washington Cost per lb.	Michigan Cost per lb.	Other United States Cost per lb.	Mexico, Cuba, and South America Cost per lb.	Canada and Alaska Cost per lb.	Total Cost per lb.
Labor	$0.044	$0.044	$0.094	$0.078	$0.069	$0.029	$0.046	$0.053
Materials and supplies	.032	.041	.042	.050	.065	.030	.043	.037
Overhead	.018	.014	.017	.010	.049	.048	.011	.021
Depreciation	.006	.006	.011	.012	.012	.012	.015	.009
Depletion	.006	.005	.012	.005	.003	.007	.009	.007
Tolls	.053	.068	.037	.020	.022	.053	.052	.049
Credits	.010	.012	.042	.002	.024	.023	.016	.017
Totals	.151	.168	.174	.176	.199	.156	.162	.161

Table I shows how much copper was produced at various costs per pound and will prove interesting to those who wish to determine just what a low-cost or a high-cost producer is.

The division of these costs among the different operations and by geographical locations is brought out by Table II.

The costs in Arizona and New Mexico are low, on account of the fact that the majority of the low-cost porphyries as well as some high-grade mines are situated there. The high depletion shown in the Montana district is due principally to the comparatively high cost of mineral land of one of the companies. The high mining cost in the Montana and Michigan districts results from the extreme depth at which the ore is mined. Reduction costs are low in Michigan, because the metal occurs as native copper and after milling only needs to be melted out of the gangue.

Table III shows the same costs itemized by the elements of expense.

"Tolls" includes charges for smelting and refining of ores or concentrates paid by many companies, including most of the porphyries, and transportation to the Atlantic seaboard. The lowest cost for toll operations occurs in the Michigan district, as the copper is there produced as a finished product by the smelteries, which are generally owned by the producing or allied companies. The low labor cost for Mexico and South America is due partly to cheap labor and partly to the methods of reporting costs. The extremely high price of labor in the Montana district is partially offset by the credit for precious metals, whereas in Michigan the high labor cost is offset only by cheap reduction.

Table IV shows how the costs rise when low-grade ore is treated. This does not include the porphyry or Lake companies.

TABLE IV. COMPARISON OF THE PER CENT OF COPPER IN THE ORE WITH THE COST OF PRODUCTION OF COPPER FOR ALL COMPANIES, EXCEPT PORPHYRY AND LAKE, FOR THE YEAR 1918.

Companies other than porphyries and Lake	Number of Companies	Production	Per Cent of Production	Accumulative Per Cent of Production	Weighted Average Costs
Ore assaying below 2 per cent....	9	121,431,566	9.69	9.69	$0.205
Ore assaying between 2 and 3 per cent.....	16	178,742,438	14.26	23.95	.209
Ore assaying between 3 and 4 per cent.....	10	475,109,295	37.89	61.84	.168
Ore assaying between 4 and 5 per cent.....	8	130,474,902	10.41	72.25	.154
Ore assaying over 5 per cent....	10	348,009,334	27.75	100.00	.134
Totals.....	53	1,253,767,585	100.00	.....	.167

The aggregate investment was over $672,000,000, which on the average for all companies was nearly 30c. per lb. of copper produced. In other words, copper producing companies on the average, need a profit of 3c. per lb. to net 10 per cent on the investment. The actual average rate of profit for the year was 28 per cent.

Rhodesia Gold Production in August, according to Financial America, was 49,621 fine oz., valued at £207,339. The production of gold in July was 51,176 fine oz., valued at £214,919.

Killing Off Our Enemies

Insidious Propaganda of the Shower-Bath Manufacturers and Tooth-Brush Makers, Spread by Dr. Darlington, Deserves Wider Publicity

BY MARK R. LAMB

"AT A meeting of the Mining and Metallurgical Society of America Dr. Thomas Darlington addressed the members. . . ."

It was a most interesting meeting. Dr. Darlington told his hearers many things which they did not know before. They were so important that it seems advisable to give them in more detail than has been done in most of the hitherto published reports.

His statement as to what makes people tired was at variance with the ideas of most of those present. Work does not do it. Though it is true that long

HYDRAULIC REGENERATION

hard work seems to precede a feeling of weariness, this is only in appearance or coincidental, and the way to be rid of the feeling is not to rest, but to take a shower bath,—and if one is not sufficient, take two. It will then be possible to go right back to the furnace and work another shift. If work is alternated with showers, there will be no opportunity to become tired. If those steel mill workers could be persuaded to take lots of shower baths, they would be so enthusiastic about their work that they would not want shorter days. It is up to the Steel Trust to put Dr. Darlington to work on that particular job.

He told all about blood counts and their importance, and it makes mine run cold to think of the terrible danger in which all those people are who do not know what a blood count of five million means! There are probably thousands of men in the Pitts-

burgh district who never stop to count their blood! There may even be a few readers of the Journal who have not got clearly in mind just what a blood count is, though I hope not, for the sake of the standing of the profession!

And then the tooth brush! Heavens, to think how ignorant I was before Dr. Darlington began to talk! It was my custom, only one day before, to

PIE A LA MODE

use my brush only four or five times daily, and then merely as a habit. But it seems that all this time, during all my forty-six years (thank you, I know I don't look it) my life has been in constant danger from pneumonia! The Doctor told us that there are forty-eight varieties of bacteria in our mouths (Dr. Copeland says sixty, but a dozen more or less is of little importance), and he added that the beverages

ESOPHAGEAL ANTISEPSIS

in use before the late disaster had kept the number down. He now expects a great increase in variety and numbers. I know now that if I eat or breathe, with these bacteria in my mouth, some of them slip into my stomach and lungs and raise——trouble. For this reason it is best to fool them by brushing the teeth between bites.

Same with breaths. In spite of every precaution, some of them occasionally get past, but Dr. Darlington has provided even for that. As soon as one feels a bacterium in his stomach, it is only necessary to use quickly Dr. Darlington's stomach brush, after first emptying the stomach. It is very simple, though at first, for lack of skill, the meals are long drawn out. And it looks funny, too. The brush has a long, flexible handle and tickles as it goes down, so it is best to practice alone. But think of the satisfaction of being immune to pneumonia and the flu! The lethal gas required to stop the bacterium which gets into the lung can be obtained from the War department.

I forgot the tonsils. They must, of course, come out first. And to think that the majority of the 600,000 people who died of the epidemic last year would be alive today had they brushed their teeth and stomachs thirteen times daily! Dr. Darlington says so. Copeland says twenty-three times.

The Doctor's story about little Adrenal is the best of the lot. What she did to those two soldiers was a plenty, but it was unfair of the Doctor not to tell how she could be employed in ordinary business affairs.

The Doctor seems to be an Irishman. The Journal published his remarks without a smile. It is difficult to understand why the members of the Mining and Metallurgical Society of America did not rise in their wrath (or amusement) and throw the Doctor out the window. It may be due to politeness, or hospitality, or habit, or simply to a lack of a sense of humor. Your mining engineer must under no circumstances display anything but complete, painful gravity, or he loses standing. A proof of this is that he cannot specialize successfully as a geologist unless he can grow a full beard.

The inventor among him will gravely shake up a few grams of hot silver ore in a test tube and announce a revolution in metallurgy, without planning the apparatus necessary for shaking up a thousand tons daily in like manner. If he had a sense of humor he would think of all those endless test tubes and laugh and drop the revolution.

It is no excuse to say that he is an ordinary human being, because he is not. He does not vote—he gets excused easily from jury duty, and he has never enjoyed a lawsuit. There is not one of him in Congress or the Senate, nor will there ever be.

The greatest joke of all is his innocent, flamboyant pride in Hoover. It reminds me of my ancestors. My uncle frequently found occasion to mention the illustrious members of our family and say how proud he was of them, but Dad would reply by wondering if the feeling were reciprocal. I am the original Hoover man for the next President, but when he is elected, I shudder to think how unbearably smug and self-satisfied your mining engineer will be.

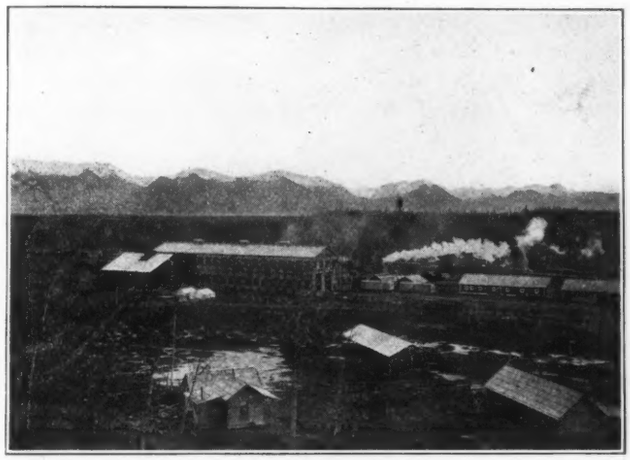
The Best Time to Leave the United States on a trip to the Far East is the late summer, in time to arrive in China about the first of October, according to J. A. Fowler in Commerce Reports. April, May, and June are almost equally fine in most parts of northern Asia. December, January, and February are the comparatively cool months in the Philippine Islands.

Alaskan Railroad Makes Rich Country Accessible

Willow Creek and Broad Pass Districts of Great Promise as Producers of Both Precious and Base Metals—Much Prospecting Necessary—Government Railroad Now 80 Per Cent Complete

BY F. LE ROI THURMOND
Anchorage, Alaska

THE great territory of Alaska is today one of the few remaining storehouses of mineral wealth which has practically been untapped, and it offers a rare opportunity to the man with a lust for adventure and fortune. The mineral industry of the country is only in its infancy. In a territory one-fifth as large as the United States, in



THE NEW MACHINE SHOP AND POWER PLANT OF THE GOVERNMENT RAILROAD AT ANCHORAGE

almost every part of which gold can be found, only thirty-one lode gold mines were operating in 1917. The difficulty has been one of transportation, and all of the lode mines so far developed are situated on, or close to, tidewater, or are naturally favored geographically, so as to render them accessible.

The government railroad now under construction inaugurates a new era in the history of Alaska. This railroad, with its terminus at Seward, a splendid year-round harbor, traverses and renders accessible a diversified region, with a wealth of mineral resources which offers great inducement to the prospector and investor.

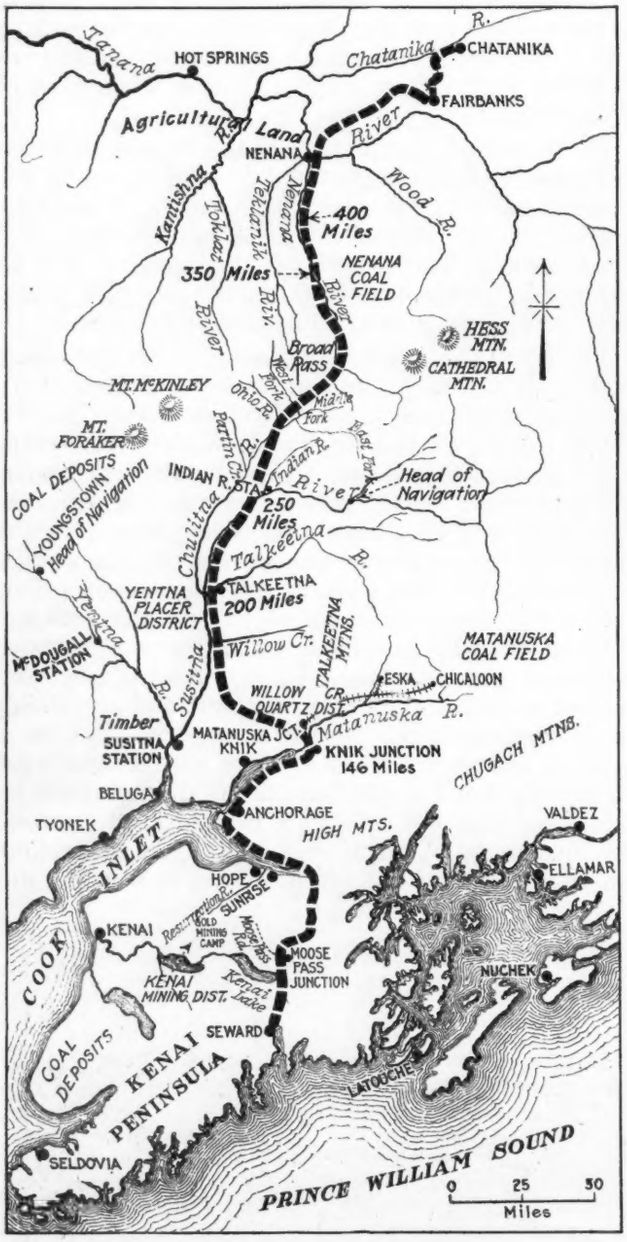
One of the best-known districts along the railroad is that known as Willow Creek, where there are a number of mines and prospects in rich, free-milling gold ores. I recently made an important discovery in connection with this camp, the identification of the minerals nagyagite and calaverite, tellurides of gold, in specimens from one of the newer mines now being developed. This is highly significant as an indication of the continuity and persistence of the ore bodies, apart from the fact of exceptional richness. These mines are in the Talkeetna mountains, where the formations are largely of granite or other acidic, ingneous rocks, of Jurassic to Tertiary age. The latter period was one of great gold deposition, some of the famous gold and silver mines of the Southwest having been formed at that time. It is highly probable that prospecting and exploration will prove another Goldfield or Tonopah to exist somewhere in this large area of granite and rhyolite.

On Iron creek, a tributary of the Talkeetna River, extensive copper prospects have been found in the form of contact, metamorphic deposits. A company headed by Joe Morris is preparing to drill this ground soon. Morris was the discoverer of the Le Roi mines, at Rosslyn, B. C., in the late '80s, which have produced $70,000,000 in gold and copper.

Probably the most interesting and promising section of the highly mineralized Broad Pass territory is found among the headwaters of the Chulitna River. Here, on the west fork of the river, occur mineralized, acidic dikes, several hundred feet wide, the gold tenor of which is sufficiently high to indicate that they will very soon be explored. In the same vicinity are numerous outcrops of chalcopyrite, most of which also contain gold and silver. This region was the scene of considerable excitement and activity in 1914 and 1915, when the railroad was projected through Broad Pass. About 200 men stampeded into the country, anxious to obtain claims on ground reputed to be enormously rich, but, as is usual in such cases, many of them were disappointed on finding that the precious metals did not grow on trees, and that the ores were complex and required the investment of much time and money to develop. Another factor of considerable weight was the uncertainty as to the time of completion of the Government railroad. A few of the more resolute and better informed have held their claims, and now, as the railroad nears completion, their reward is in sight.

ANCHORAGE HARBOR, APRIL 22, 1919

On the Ohio River, fifteen miles from the west fork of the Chulitna, occur a number of veins outcropping on ground held by Dr. McCallie and associates, of Anchorage. I was commissioned to examine and report on these properties, and to obtain the necessary data made two trips to the region in 1918, one in the spring by dog team, and the other in August and September, going on foot



MAP OF COUNTRY ALONG THE ALASKAN GOVERNMENT RAILROAD

with pack horses. The information gained on these expeditions was such as to warrant further work to determine the extent of the promising prospects.

The ores consist of sulphides of copper, lead, zinc, and iron, with high silver and gold content. Silver is associated with the lead sulphides, or carbonates where they have been formed by surface alteration, and the gold occurs with the copper. High assays of silver are common, and gold runs from a trace to several ounces per ton. Copper and lead vary considerably, but I obtained 4 per cent copper over a width of 8 ft. where one of the veins outcropped. The ore, being complex and having the precious metals contained in the sulphides of the base metals, will require smelting, and the indications are that much of it will be rich enough to stand the long haul to the Tacoma smeltery without previous treatment.

AT MILE 260 OF THE GOVERNMENT RAILROAD, MARCH 6, 1919

Still, large quantities will require enrichment by some of the standard concentration processes. Flotation probably will prove best adapted, as that process is fast displacing gravity methods on ores of a similar character.

On Partin Creek, ten miles from the Ohio River district, a large copper-silver-gold-bearing vein occurs in limestone. Not far from here, on Coal Creek, I discovered a granite-slate contact with a wide zone of massive pyrrhotite and sphalerite, carrying gold and silver.

I have mentioned only a few of the typical instances of mineralization which came under my own observation, but many other occurrences are known. Although little prospecting has been done, the mineralized area is known to extend about twenty-five miles from the headwater of the west fork to the head of Partin Creek, and almost no prospecting has been done outside of this area. Further and more thorough exploration which will follow the development of this region by the railroad, will undoubtedly uncover many more ore deposits. The number of prospectors in the region is ridiculously inadequate to the task in hand—about a dozen men on the whole southern flank of the Alaskan Range, west of Broad Pass.

The region is not a difficult one in which to work, there being no timber except along the larger streams. At elevations of 2,200 ft., only alder brush is found, and 500 ft. higher the mountains are bare. The rock formation consist of sedimentary beds, slates, cherts and limestones, which were tilted at

the time of the uplift of the Alaskan Range and intruded with granite and other acid eruptive rocks. These intrusions were of Jurassic age and are the cause of the mineralized veins found in the sedimentaries and along the contacts.

From the point of view of natural beauty the country is wonderfully attractive, containing inland seas, great rivers, glaciers, and mountains of unsurpassed grandeur. Mount McKinley, 20,300 ft. high, the loftiest peak in North America, is only thirty miles from some of the prospects named, and is visible from points 200 miles to the north or south. The

OUTCROP OF 15-FT. MINERALIZED VEIN NEAR HEAD OF OHIO RIVER

railroad, now 80 per cent complete, will render this region accessible to tourists and travelers, who will also be attracted by the big game which abounds on the slopes of the Alaskan Range, the big brown bear of the coastal regions, the moose, sheep, caribou, and goats in favored localities.

Following the prospector and miner, the tourist, and the hunter will come the tiller of the soil, the artisan, the home seeker. Industries will spring up, flourish, and cities be built in a day, and millions of people living and yet to live will find in this newer land an inexhaustible supply of natural wealth, in return for faith and work.

"Long have I waited lonely, shunned as a thing accurst,
Monstrous, moody, pathetic—the last of the lands, and the first;
Visioning campfires at twilight, sad with a longing forlorn—
Feeling my womb o'er pregnant with the seed of cities unborn.
Wild and wide are my borders, stern as death is my sway;
And I wait for the men who will win me, and I will not be won in a day;
And I will not be won by weaklings, subtle, suave, and mild,
But by men with the hearts of Vikings and the simple faith of a child;
Desperate, strong, and resistless, unthrottled by fear or defeat,
Them will I gild with my treasure, them will I glut with my meat."

Robert M. Service.

Chilean Opinion Concerning the Nationalization of Mines*

Many have suggested the idea of nationalizing the mines, turning them over to the Treasury, with due respect, of course, to previously acquired rights, and, imitating the German and Prussian regime, to create a technical and administrative organization, as in the exploitation by the German State of the deposits of the Sarre Valley, the Hartz, and Upper Alsace. This system would be a complete failure in Chile, where politics controls everything.

Centuries will pass, perhaps, before the Chilean State will have acquired industrial capacity. It is enough to consider how many years the Railroad Administration has operated at a loss; and this is an enterprise that does not fail to yield profits in any part of the world. In Chile it leaves a deficit.

The better plan is to continue the working of the mines by private capital, without distinction to Chileans or strangers. Foreign capital, whether American, English, French, or of any other nationality, serves to increase the natural wealth in general, and although the greater part of the utilities are exported, in fact they remain in the country in salaries, freight charges, and the buying of national articles (coke, cement, and similar materials) in large quantities.

*Translated from the Bulletin of the National Mining Society of Chile, No. 243, p. 376.

Intercooling in Two-Stage Air Compression is particularly important, as on the efficiency of intercooling will depend the overall efficiency of the compressor and the equalization of the load between low-pressure and high-pressure cylinders. The intercooler should not only cool the air from the temperature at which it is delivered from the low-pressure cylinder, but it should also condense and remove the moisture from the air. The more efficient intercoolers will reduce the temperature of the air close to that of the cooling water with a minimum amount of cooling water. No intercooler should allow the cooling water in any part to become hot enough to precipitate scale. The air should be broken up into thin sheets in contact with the cooling surfaces. One square foot of cooling surface per six cubic feet of air passing through the intercooler per minute is given by one manufacturer as the ratio of cooling surface to air volume, and the same manufacturer claims that two and one-half gallons of cooling water per minute per 100 cu. ft. of air passing the intercooler will reduce the air temperature to within eight degrees of the cooling water if the intercoolers are properly constructed.

Standard Chutes for Metal Mines*

Several Factors Influence Selection of Those Used Underground for Loading Ore Into Tram Cars—Special Chute Doors Designed With Respect to Needs and Permanency of Chutes

BY CHARLES A. MITKE

CHUTES are used for the purpose of passing ore and waste to different levels in a mine. They are also utilized for storage, and frequently, when not necessary for ore or waste, are kept open entirely for ventilation purposes. In general, chutes are 100 ft. high (the usual distance between levels), although some are much longer, and others are shorter than this figure. When a raise is driven, it is customarily divided into two compartments, one for the manway and timberway, and the other (the chute), for the passage of ore or waste. Various types of raises which are in common use are as follows:

Two-compartment raises (one for chute and the other for men and timber.

Six-post, square-set raise, generally used in square-set stopes in medium ground.

Four-post, square-set raise, occasionally used in caving methods. This raise is similar to the six-post raise, with the exception that the compartments are much smaller.

Crib raise, used in square-set, top-slice, cut-and-fill, and shrinkage stopes in heavy or broken ground.

Raw chute, usually oblong in shape, about 4 x 7 ft., with no timber except a partition between the chute and manway. Used only in hard ground mined by cut-and-fill, shrinkage, and to some extent by caving methods.

One-compartment raises (chute only).

Four-post raise, used in caving methods in medium ground.

Crib raise, used in heavy ground mined by caving methods. In rare cases angle iron is used in its construction to prevent excessive wear.

Raw chute, or "finger raise," circular, about three feet in diameter, no timber employed in its construction. Used only in medium or fairly hard ground.

Rock-built chute. Constructed in the shape of a well, generally about six feet in diameter. This class of chute is built in loose ground.

Concrete chute. For heavy ground. Usually circular. Used where there is a great deal of wear in the chute.

The requisites for a standard chute are as follows: Safety in situation and operation, efficiency in handling ore and waste, and economical construction and upkeep.

Formerly, chutes were placed in the center of drifts, to facilitate the dumping arrangements and permit the use of end-dump cars. Though this was a great convenience from the standpoint of haulage, there was the constant danger of men falling into the chute. According to safety rules, boards were to be placed over these openings and to be removed only when cars were dumped but frequently miners would forget to replace them when the cars were empty with the result that many a man has lost his life by falling into the opening. In some states this practice is now prohibited, the law stating that the chute shall come up at the side instead of in the center of the drift.

The manway, adjacent to a chute, should be placed far enough from the haulage track so that the men climbing up and down the ladderway will not step directly in front of a moving train. One of the principal operating conditions to be avoided is the "hanging up" of a chute. It is usually a dangerous procedure for a chuteman to bring down a chute which has been choked or "hung up." Should the obstruction occur some distance up in the chute, say 80 to 100 ft., it may cause an air blast, which would break the chute and injure the trammer.

Sufficient Clearance Above Cars Is to Be Desired

The chute mouth should be high enough so that a man will not have his fingers caught between the chute and a car. This is sometimes difficult to arrange, as there are mines where five different kinds and sizes of cars are used, all being loaded from the same chute. Such a diversity in sizes of cars naturally results in insufficient clearance for the larger ones and too great a clearance for the small cars. This latter condition in itself creates a danger, as, when small cars are used, the ore, dropping from a distance at high speed, may injure the runner, especially when the car is nearly full and it is necessary for him to close the chute gate immediately.

In all average drifts provided with electric haulage, the trolley wire is immediately above the mouth of the chute. The larger drifts possess the advantage of an extra timber set above the trolley wire, upon which the chute runner works, there being a flooring between him and the wire, thus preventing his coming in contact with the electric current. Provision must always be made in the smaller drifts to protect the runner from the trolley wire. In some instances, the live wire is insulated and carried along the opposite side of the drift, the overhead wire being dead for a distance of about ten feet and acting merely as a guide for the trolley wheel. In other cases, the overhead live wire is boxed in with boards on the sides and has a hinged door beneath, which can be pulled up and hooked, in this way completely isolating the trolley wire. Another practice is to have a switch near the chute so that the current in this section of the wire can be turned off and on at will. In exceptional cases the trolley wire is cut

*From a paper, "Compilation of Chute Types for Loading Ore Into Tram Cars in Metal Mines," presented at the Eighth Annual Safety Congress of the National Safety Council, Cleveland, Ohio, Oct. 1 to 4, 1919.

about five feet on either side of the chute mouth, and may be detached and moved away bodily. This, however, involves considerable trouble.

Where Possible, Men Should Have Ample Working Room

A by-pass is frequently made by removing a half set of ground immediately opposite the chute, and a bench is provided upon which the runner stands. This should be high enough to enable him to reach across and tap the chute and also to use a pinch bar to advantage in loosening the large boulders which frequently clog up the mouth. The by-pass is an excellent safety provision as it gives the operator an opportunity to step out of the way in case there is an unexpected rush of ore out of the chute. In caving methods, where there are lines of chutes on both sides of the drift, a by-pass is impossible and the runner must load his cars by standing at the side of the particular chute from which he is drawing.

It is important that all chutes be properly situated with respect to the levels above and beneath the stope through which they pass. The convenience of the stoping arrangement depends on the placing of the chute as well as the tramming distance. A chute should be adapted to the particular needs of the orebody in question. In certain classes of ore large chutes are necessary, though in others smaller ones may be used to advantage. In some cases many thousand tons of ore must pass through before the chute is finally abandoned, and the tonnage grades down from this to but a few tons in other instances, consequently, the construction of the chute under the first-named condition must be stronger, more lasting, and naturally more expensive than the type of chute which would suffice in the second instance.

Unrestricted Flow of Ore Into Cars Is Desirable

The construction of a chute should also be such that the ore will flow readily into the cars. One of the difficulties with chutes that has not yet been overcome is the fact that all ore has a tendency to "hang up," or stick in the chute. A suggestion which has been made and tried is that of having a breaker staggered on each set throughout the chute. The ore, being dumped into the chute on the level above, strikes the first breaker and is thrown to the breaker on the other side, and from there zigzags down the entire length without stopping until it comes to rest near the chute mouth. These breakers impede the progress of the ore and prevent it from packing solid in the bottom of the chute, and naturally, the chute is less likely to "hang up." Good results were obtained from a trial of this chute, the only objection being the extra cost of construction in placing the breakers on the sides. The inclination of the chute mouth has considerable effect on its efficient operation, as certain classes of ore run more readily than others. The character of the ore, therefore, must be taken into account before adopting a standard chute and mouth.

The cost of constructing chutes should be kept at a minimum. It would be a waste of money to have a chute constructed to last much longer than the life of the stope, while on the other hand, it would also be poor economy to build a chute of such light construction that it will need constant repairs long before that section of the stope has been abandoned.

Formerly chutes were provided with a wooden bottom and the ore was taken out immediately beneath the chute mouth. As a consequence, the ore dropping down the chute soon wore out the bottom and then filled in the sides of the drift. This practice is still continued in a number of districts, even though it involves an unnecessary expense to the company for upkeep and repairs, but it is obsolete in the most up-to-date mines. Wherever possible, the bottom of the chute should be in the solid ore or rock, which condition decreases the cost of upkeep, as ore striking on a wooden bottom would soon cut through.

After the size and character of the chute have been worked out with reference to the class of ore and decided upon, it is economical to have the timbers selected and cut to measure on surface, so that the total number of pieces necessary for its construction can be sent down at any time, and the chute mouth installed without any additional cutting underground.

General Types of Chutes Now Used

Fig. 1 illustrates a type of chute mouth used for loading small cars from stopes containing high-grade ore which are operated by the square-set method, or in stopes mined by caving methods where frequent blasting is done. The chute mouth is made of 3-in. boards, and the construction is such that the opening is given the proper inclination and a clearance of approximately 4 in. is allowed between the chute mouth and car. The door, which controls the flow, consists of three boards that operate in slots parallel to each other. The mouth of the chute is about 4½ ft. long, and the ore dropping down the raise strikes on the hard rock which has been left there for the purpose and then runs towards the car as the chute is drawn off. This type of chute mouth is generally used in small drifts ranging from 3 x 6 ft. up to 5 x 7 ft. in the clear.

In drifts where the ore is drawn from the square-set stopes the chute runner usually loads his car by standing on a bench opposite the chute mouth. Sufficient ground behind him has been taken out beyond the regular drift set so as to allow a certain amount of room for him to step aside in case of an unexpected run of ore from the chute. In caving methods, however, he loads his car by standing at the side of the chute instead of in front, for owing to the fact that the chutes are numerous, being generally placed opposite each other, there is no room for a bench. In loading, he uses a 5-ft. iron bar to pry up the three boards and allow the ore to run into the cars. In case a boulder should become stuck in the chute and hold up the ore, he uses his bar to dislodge it. Should he be unsuccessful, he must then get powder, tie it to the end of a stick and put it near the boulder. After the shot is fired, the boulder is usually broken and the ore

continues to run down the chute. When the car is full he uses the bar to strike each board in succession and cause them to drop, thus cutting off the flowing ore. In the event of one of the boards sticking fast and refusing to drop, enough of the chute mouth will be covered by the other two to stop the ore from running.

Another type of door is that shown in Fig. 2, which has an iron gate bolted to the sides of the chute. It is provided with a handle and can be raised by a man standing on the car or by the use of a bar operated when one is standing on the track. The gate has a bolt on each end and operates on hinges, and the result obtained is similar to that secured by use of the boards.

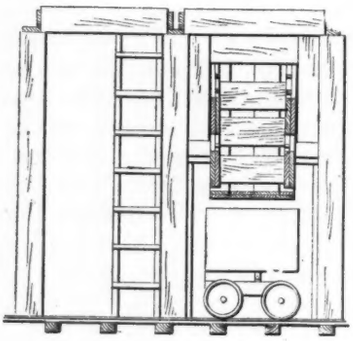


Fig. 1

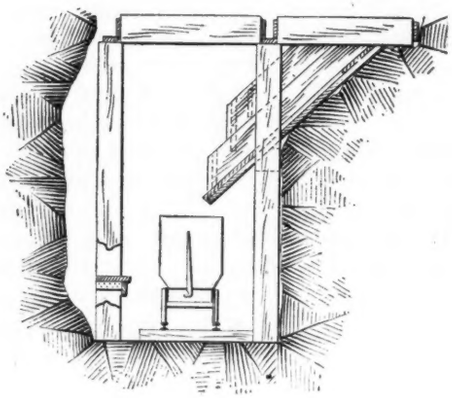


Fig. 3

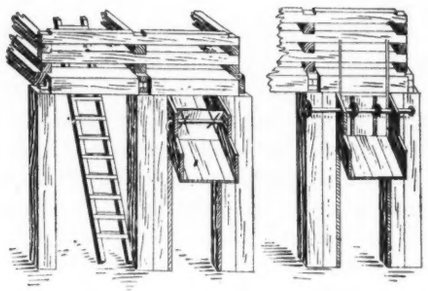


Fig. 4

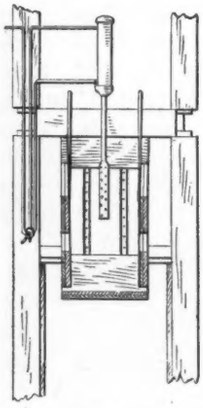


Fig. 5

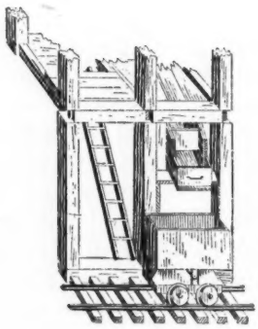


Fig. 2

GENERAL TYPES OF CHUTES IN METAL MINES

In drifts of this character, larger cars are used, the area of the drifts are larger than those of hand tramming and the chutes are either operated from the drift or from the extra pony set above the drift. The chute and chute mouth shown in Fig. 1 is frequently used in drifts of this character, being, of course, built in proportion to the size of the drift. Fig. 3 is the same kind of a chute and chute mouth as those shown in the preceding illustrations, but is provided with a different type of door. The door is built in the form of a sector, made of iron, and provided with a handle. A piece of iron pipe may be used on the handle in order to secure greater leverage. Built to a smaller scale this chute mouth and gate is occasionally used in hand tramming drifts in square set stopes, but more frequently in the larger drifts, with, of course, proportionately greater dimensions. Such a door may be operated either from the level, in a hand tramming drift, or from the floor above, in a motor-haulage drift. In the latter case, the chute door is, of course, sufficiently high so that the operator can open it by standing in the pony set and also punch the chute from that floor. This class of door is in common use on main haulage drifts where block caving is the mining method employed. However, the chutes leading directly to the main haulage level are usually situated in ground that is not very heavy and will therefore not be subject to change.

Fig. 4 represents an iron door which is actuated by means of a slide and small gear wheels on the ends. A large wheel, which may be operated from one side of the chute, serves to raise or lower the door.

The construction of the door shown in Fig. 5 is similar to that in Fig. 4, with the difference that it is operated by means of a compressed-air cylinder. The operator merely turns an air lever, which raises the slide and allows the ore to run through the chute. When the car is full and it is desired to close the chute, the air is turned off by reversing the lever. At the same time a second lever is turned on and air is forced into the rear end of the cylinder, closing the door. If a boulder should get caught it may then be necessary to open and close the door several times in order to dislodge the obstruction.

The principle used in the construction and operation of the chutes shown in Figs. 1 and 2, for use in hand tramming drifts, is practically the same. Both have rock bottoms, and the raises (which include chute and manway) are not immediately over the drift, but are placed at one side. Sufficient ground has been removed under the manway compartment so that the ladderway will be far enough from the drift to prevent a man from stepping out in front of a car. Fig. 1 illustrates the chute and door in use at most of the mines where block caving methods are used. Fig. 2 is used principally in top-slice stopes, and not so frequently in other caving methods, the reason being that the drifts in which Fig. 1 is used become heavy, and the chutes soon go out of shape and require a change made in the

size of the door, which can easily be done by cutting the wooden gates to suit the changes caused by crushing, whereas an iron door could not be so readily adapted. These represent two of the best types of chute mouths and gates for use in hand tramming drifts. They are economical, durable, and, if the bar is employed and the men use care, are comparatively safe.

Of the three iron doors shown in Figs. 3, 4, and 5, No. 5 is far superior to the two others and can be used in every instance where the others are employed. It is absolutely safe in operation and requires little repairing. The amount of compressed air used is also small. Its cost, as compared to the other doors is somewhat higher, but the expenditure is justified in places where a large amount of ore must be handled.

Clearance Dependent on Type and Height of Car

The matter of clearance for safety depends entirely on the type and height of car. As stated before, in one of the most up-to-date mines five different types and heights of cars are used, all loading from the same chute. In this instance it would be difficult to specify what amount of clearance between the chute and the car should be adopted as a standard. Therefore, before a standard clearance can be decided upon, it is first necessary to decide upon the standard size and height of car which is to be used on that particular level. The clearance between cars should be sufficient to permit of a man's passing between them.

Adoption of Standard Gage Underground

The discussion of a standard car raises at once the question of a standard gage. The 18-in. to 22-in. is still the practice and a standard gage of about 20-in. should be maintained in practically all metal mines. In deciding on a standard gage, the main consideration is that it must be suitable for the size of drift or tunnel which has been found to be the most practicable and economical for prospect work. The use of larger gage of from 24-in. to 30-in. is of advantage on main haulage drifts, where the ore has already been proved up and the expense of driving the large tunnel for the haulage train is absolutely justified. It would, however, be entirely out of the question to ask operators to drive large tunnels of this character for prospect work merely to standardize on the gage.

In general, a large number of companies use two gages, the 20-in. for all prospect and ordinary working drifts, and a larger gage, about 30-in. for the main extraction tunnels only. At the present time there are mines in the Southwest which have already standardized on the gage and type of car. In one particular mine, an 18-in. gage is used throughout the entire mine, with only two types of cars, both being the same height, which simplifies the matter of chutes and chute doors, the chute mouth shown in Fig. 1 being used throughout. It might well be said that this company has standardized on gage, cars, chute, chute door, and clearance.

The Mining Law

THE announcement that the Bureau of Mines will resume its efforts to draft a revised mining law —which work was set aside during the war period— will, it is believed, be received with general approval by the mining public. Whether or not Congress will see fit to act upon such suggestions as may eventually be made by the Bureau is another question.

In a country where it has become more or less customary to revise and amend laws and regulations relative to every phase of human endeavor, it is a matter of amazement when one realizes that the fundamental mining law, enacted in 1872, and inadequate and unsatisfactory in many ways since the day of its inception, has remained, year after year and Congress after Congress, unaltered and untouched by any hand, sacred or profane!

The mere miner or other layman unversed in the art of interpreting court decisions often stakes out his claim and starts to develop his ore, secure in the belief that his observance of the requirements of the law—as it appears to apply in his case—will give him ample protection and "make his title clear." If his efforts remain uncrowned by success he will oftimes proceed, unmolested, on his way. If not, however—if rich ore rewards his labors—fortunate, indeed, is he if "litigation" does not descend upon him and bind him hand, foot, and pocketbook.

This condition has long confronted the mining public. Thirty-five years ago that master engineer-humorist, Rossiter W. Raymond, offered a rhymed solution of the difficulties often attending the successful exploitation of a mining claim, which might still be apropos.

The surprising thing, from the 1919 standpoint, is the fact that Raymond's prospector had three friends! Whether the last remnant of the genus prospector, who was recently reported to have been seen at about Lat. 30 N., Lon. 40 W. from Washington, could muster a sufficient number of coadjutors to carry out the suggested plan remains a matter of grave doubt!

The bit of verse reads as follows:

THE LAW OF THE APEX

BY R. W. RAYMOND (1884)

There was a miner in the West, and truly wise was he;
His head it was the levelest that ever you did see.
Now he had found a silver ledge outcropping to the view;
And down he sat upon its edge, to muse what he should do.

This knotty question to decide, it was no joke, because
His reading had been deep and wide in all the mining laws.
The coast of his experience showed full many a gallant ship
Wrecked on those dangerous rocks, the Lode, the Apex, and the Dip.

Quoth he unto himself, "Now, Jim, you ain't no saint, I fear;
But you just follow that old hymn, 'an' make your title clear!' "
Descending from the summit lone, he sought, that miner keen,
Three friends, Hans Breitmann, Mike Malone, and G. McClellan Green.

With them he shaped his wily plan; locations three they made;
And lo! the claim of every man across the rest was laid.
First, Breitmann claimed a mineral vein according to the strike;
But over this was spread again the placer claim of Mike.

And, pointing with a skillful aim to where the ore was seen,
Appeared the dangerous tunnel claim of G. McClellan Green.
Then in ejectment Mike brought suit to make Hans Breitmann quit
(And some revolvers they did shoot, but nobody was hit).

The lawyers they explained the law, the experts made the facts,
The judges they said "hum" and "haw," and quoted various acts.
The jury found against Malone, and he retired serene;
While Hans was left to pick a bone with G. McClellan Green.

This time the fight was harder yet; injunctions filled the air;
Old stakes were moved; new stakes were set; bold witnesses did swear.
A model for one side displayed the mine in minim size;
The other side a model made, which looked quite otherwise!

The experts brought their biggest books, to make the battle hotter—
Dana, Le Conte, De Beaumont, Jukes, Bischoff, Grimm, Groddeck, Cotta,
Gaetzschmann, Posepny, Buratt, Lyell, Newberry, Whitney, King,
Sandberger—and, in short, a pile of almost everything.

Stenographers took down the case, and made their talent felt
In jargon written out of place and proper names misspelt.
To try it without jury's aid both parties did agree;
Because a jury can't be paid with a contingent fee.

At last 'twas over; and the judge declared his final mind;
He thought the science mostly fudge; the models very blind;
He said that he had seldom heard such learned counsel speak.
(Though plaintiff's counsel was absurd, because his cause was weak.)

In short he gave to Hans the case; and surely ne'er was seen
A calmer man in his disgrace than G. McClellan Green.
With Mike and Hans that night he met their common partner Jim.
"Old boy we've fixed it now, you bet," each partner said to him.
"And when we want to stake OUR land, and own it without fuss,
We'll come to you to take a hand and do as much for us."

Experts, and lawyers, paid in shares, soon looked exceeding grim;
For Hans had made, all unawares, a previous deed to Jim.
So thus the prudent miner got a title without flaw,
In spite of every puzzling spot that marks the mining law.

True, when they came to work the claim, the ore soon petered out,
And nothing but the silvery name showed silver was about.
But ere that time, the famous suit had brought the mine renown—
Jim sold it to a Tenderfoot, and got his money down!

Unrest in Colorado

May I salute—"Hail the Chief!" and wish you a beaten trail, at the "New Discovery" (E. & M. J.)? May you always have a pay streak, as it is most discouraging to swing a Single Jack in barren rock. Be it "Silver Plum" granite on top the siliceous plate of your Mahogany.

It is because of profound respect, admiration of your teachings, that I have stepped into the limelight to offer my best wishes; though, as I write, its diffused rays hurt my eyes, since I am more used to the softer glow of carbide hanging at the tail end of the mine car as I muck down the pile. I have no alibi to offer for my rashness, since nothing has passed down my throat these many, long, weary days, but I suspect that while handling one of the Market Sheets sent out of late from your office, I must have contracted one of the unrest germs I read so much about. At this I am alarmed, and know not whither to turn for a remedy.

The doctors, I read, disagree in a diagnosis. The chief surgeon—a fellow named Woodrow Wilson, I am told—appears to be doing a lot of experimenting, by calling in a bunch of chronic belly-achers and dosing them with his nostrums (strickly private formulas) of five, six, seven and eight dollars per day, doses to be taken about every six hours, and each cautioned to as little exertion as possible.

A Swede came by the other day—before I contracted the germ. He was ailing; his head hurt; his muscles were tired, and his legs weary. I thought I could aid him with four Silver Dollars per day to lean on a shovel. But he told me a Prophet Divine by the name of Finlay, J. R., would give him a gold-cure receipt awful cheap, that would banish his ills and cover the patches on his seat. If that be the case, please send that receipt, for I've lots of gold but little to eat; and I beg of you to see Prophet Finlay and discover his wonderful remedy, since he would sell gold pills so cheap. Yours very sincerely,

F. C. Grace.

Scotia Mine, Salena, Col., Oct. 22, 1919.

Will Co-ordinate Alloy Research Work

The Division of Industrial Research of the National Research Council is arranging for the formation of a co-operative association to plan and support fundamental researches in alloys. The office of the executive secretary is at 1201 Sixteenth St., Washington, D. C. Although much valuable work has been done in this field by scattered investigators, a well-planned and co-ordinated effort by a co-operative association working under the general guidance of the National Research Council, and composed of specialists representing both the manufacturers and the more extensive users of alloys, can produce additional results of great importance.

A special scientific staff is planned, composed of a director and assistant director of research and a group of technical experts who will give their whole time to the work.

PETROLEUM SECTION

Engineering Notes and Equipment Details
Production Statistics—Progress
in Important Fields

Controlling a Gas Well

Details of a Method by Means of Which the Flow of Gas From a Large Well Was Effectually Checked

BY SETH S. LANGLEY

IN THE Journal of July 12, 1919, there was described the method by which a large gas well in the Elks Hills oil district of California, which had caught fire, was extinguished. The steps then taken to secure the well and put it under control are described in the following: After allowing the earth to cool for a few days, a drag-line excavator removed enough material to expose the first collar of the casing. The greater portion of the first joint had

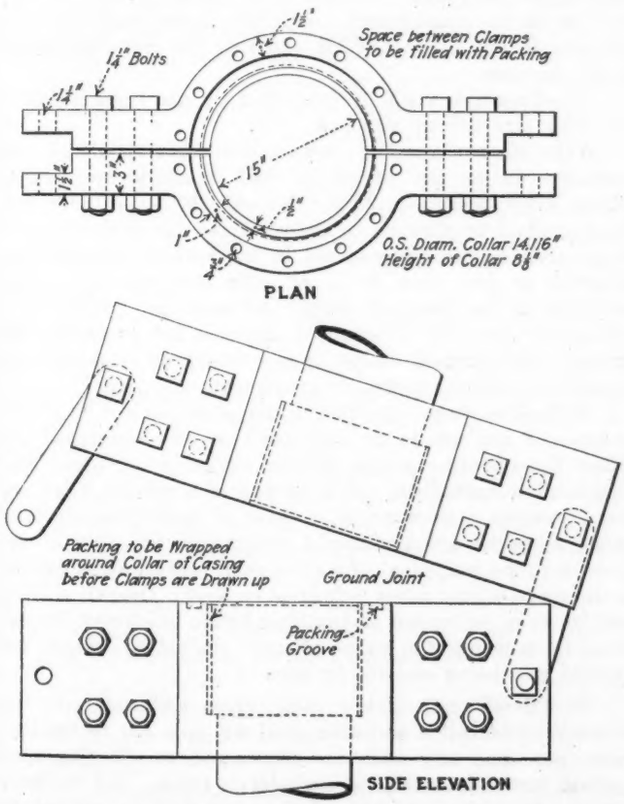

1¼" Bolts
Space between Clamps to be filled with Packing
15"
O.S. Diam. Collar 14 1/16"
Height of Collar 8⅝"
PLAN
Packing to be Wrapped around Collar of Casing before Clamps are Drawn up
Ground Joint
Packing Groove
SIDE ELEVATION

FIG. 1. PLAN AND ELEVATION OF CLAMP TO FIT 12½-IN. CASING COLLAR WITH LATCH FITTINGS

been worn away, but the lower collar was in good condition; the joint was broken at this point, leaving the collar on the second joint. A clamp was made in two parts to fit around the collar and with a shoulder to grip the casing below the collar; the collar served to hold the clamp from being torn off. On each end, the clamp was machined to take a latch arm, held with 1¼-in. bolts, as shown in Fig. 1.

When in position, the clamp came ½ in. above the casing collar. Hydraulic packing was wrapped around the collar and in the space between the halves of the clamp, which was then bolted tight. A similar clamp was bolted to another 12½-in. collar, and the two clamps hinged by the latch arm at one end. The remaining fittings were then made, all of 12½-in. casing type—a short nipple, one cross, 12½x12½ by 4x4 in.; a short nipple, gate valve, and 10-ft. joint of casing. On the cross were connected two 4-in. nipples with 4-in. gate valves; cribbing supported the made-up fittings. From the outer end a cable was rove over the crown pulley of a nearby derrick and another cable carried back to a hand windlass, Fig. 2. The fittings were then raised, both cables kept in tension, and when in a vertical position a drift pin was driven through the second latch

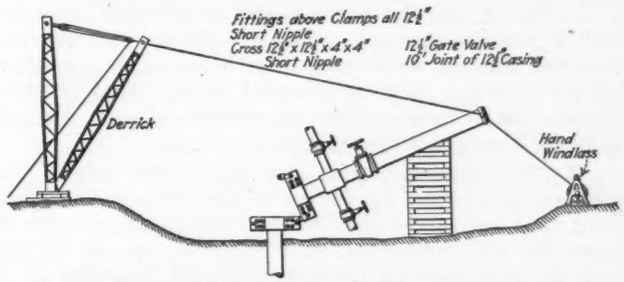


FIG. 2. METHOD OF RAISING FITTINGS INTO POSITION

arm and the ¾-in. bolts were put in the clamps. Concrete was then poured in forms to make a block to come up over the clamps.

The well is gaged to be making 185,000,000 cu. ft. per day. This is considered to be the largest gaged gas well of which there is any knowledge.

Oil Struck in Montana

What is considered to be the most important discovery of oil in the history of the state of Montana was made recently by the S. Vandusen Oil Co. in Devil's Basin, twenty-seven miles north of Roundup. The bringing in of this well, with an estimated capacity of 500 bbl. per day, gives indication of substantial future production. The well so far has penetrated the oil sand for only a distance of several feet, and it is expected that an increased production will be obtained at greater depth. The sand has an estimated thickness of about 100 ft., according to indications found in the sand cut in Woman's Pocket field, twenty miles distant, where a well of 200 bbl. was brought in several months ago. It is expected by geologists that when the sand in the Devil's Basin district has been bored deeper, a possible capacity of 1,000 bbl. per day will be obtained.

Oil Operators and Workmen Reach an Agreement in California

Terms Governing Relations Between Producing Oil and Gas Pipe-line Companies and Oil Refineries Determined by President's Mediation Commission

AN INTERESTING memorandum of the terms governing the relations between producing pipe-line and refinery companies and their employees operating in California oil fields has just been agreed upon by the President's Mediation Commission, consisting of J. L. Spangler, E. P. Marsh, and Hugh L. Kerwin, and the operators' committee, consisting of A. L. Weil, chairman of the joint committee; L. J. King, C. A. Hively, E. S. Durwood, and F. F. Hill, of the field committee; A. F. L. Bell, E. I. Dyer, Lionel Barneson, and G. H. Van Senden, of the refinery committee, and R. E. Maynard, E. B. Partridge, F. A. Simms, and Max Dyer, of the pipe-line committee. The memorandum is made effective by the signature of individual operators. The general terms and Schedule A, together with general specifications applying to oil-producing companies, follow. Schedule B and C are omitted, as they apply to pipe-line and oil-refinery companies. The general terms of the memorandum are as follows:

I—That during the period ending at midnight, June 30, 1920, all matters of wages, working conditions, and any controversial matters which may arise between the operators and the workmen, shall be governed by the terms of this memorandum. There shall be no cessation of work through strikes or lockouts during said period of time.

II—The operators during said period shall pay to the workmen, as provided by the law of the State of California (until said law is changed, semi-monthly), the amount of wages for the various classes of workmen set out in the three schedules annexed hereto and marked Schedules A, B and C. Schedule A refers to oil fields, Schedule B refers to pipe lines, and Schedule C refers to refineries.

III—All workers covered in the attached schedules (not including unskilled laborers or skilled craftsmen who have been paid the prevailing locality rates for their crafts, or men employed in construction work, unless permanently employed) shall receive back pay of 50c a day for every day worked from Jan. 1, 1919, to June 30, 1919, both inclusive. Such payments shall be made by the employer or the employers of such men for the period of their employment; it being understood that where any employer has actually paid to any man an increased wage over the amount paid by such employer for like work on Dec. 31, 1918, such increase shall be credited on the amount of back pay. Each employee entitled to back pay must, on or before Dec. 31, 1919, make written application to each employer for whom he has worked during the period specified, for the back pay to which he is entitled, either by letter or on forms provided by the company, and any employee who fails to make such application within such time shall lose all right to such back pay.

IV—If the terms of this memorandum are fully and fairly lived up to by the men during the year ending June 30, 1920, the operators will, within forty-five days after June 30, 1920, pay to every man covered by the annexed schedules, who has been in the company's employ not less than thirty days during the period of this memorandum, 25c for every day worked by such man for the operator; provided, however, that such payments shall not be made to any man who leaves the company's employ through concerted action, or under conditions that endanger the operator's operation, or who is discharged for willful misconduct. This does not cover men classed as roustabouts or men whose wage is determined by the Macy scale, or men who are paid 25c or more in excess of the wage stipulated for their class in the schedules. If any workman is paid more than the amount stipulated for his class in the annexed schedules, but less than 25c a day more than such stipulated wage, the excess so paid is to be credited to the operator on the additional pay referred to in this paragraph. The question as to whether the terms of the memorandum have been fully and fairly lived up to is to be conclusively determined by the present members of the President's Mediation Commission. In order to avoid any uncertainty, the classes which are to receive the additional pay referred to in this paragraph are specifically indicated in the schedules.

V—Eight hours' actual work at the plant or place of employment shall constitute the work day in the oil industry, subject to the provisions of the schedules hereto attached. Employees covered by any classification are expected to perform any duties to which they may be assigned. If work of a higher class is required of an employee he shall receive the wage of the position to which he has been assigned for as long a time as he occupies that position. If employees are temporarily shifted to any position paying a smaller wage, no reduction in wage will be made, but in case a man's services are no longer required in his class, instead of laying him off the management, with his consent, may transfer the man to any other position and rate the wage according to the position.

VI—Overtime shall be controlled by the regulations in the schedules hereto attached.

VII—Where boarding houses are maintained by the operators during the period of this memorandum, a flat charge not exceeding $1.25 per day will be made for board. No rent shall be charged to the workmen for bunk-house or dormitory accommodations; but in the several oil-producing districts, on the pipe lines, at refineries and the allied branches of the industry, where cottages are provided, a reasonable rent may be charged therefor, not exceeding the amount now charged, except in case where no rental is now charged or where material improvements are made.

VIII—The wages specified in the schedules are minimum wages and are not to be considered as any restriction on either the operator giving or the workmen accepting any additional compensation either by way of a greater wage per diem, a bonus, a premium or a share of profits; but so long as the schedules are maintained, no increase in wages in one class or to the individual of a class shall necessitate a change in the wage of any other individual or class. Operators shall not, however, by reason of anything herein contained, be justified in reducing the wage of any individual below the amount now being received by him.

IX—Membership in any labor union affiliated with the American Federation of Labor shall not be a bar to employment, nor shall any man be discharged or discriminated against for membership in such labor union. No business between the union and any of the men shall be carried on at any time during a man's hours of employment except in matters of sickness or death. No intimidation or coercion of any kind shall be used for the purpose of inducing or compelling a man to join the union at any time.

X—The "adjuster" hereafter referred to shall be afforded every opportunity to familiarize himself with actual working conditions in the field. If, after such investigation, it appears to him that the classification as shown in the annexed schedules is inequitable in any particular, he shall call a meeting of the Operators' Committee and lay the matter before them, with his recommendations, and if it shall

appear to the Operators' Committee that the classification is inequitable in any particular, proper changes shall be made therein.

XI—Hywel Davies is hereby named as "adjuster." The duties of the adjuster shall be: First, to familiarize himself with operating conditions and from time to time make representations to the operators or to the men as to any matter which he deems should be changed for the welfare of the industry as a whole. Second, whenever in carrying out the provisions of this memorandum any controversies over questions of facts shall arise, and the individual workman or any group of workmen shall find himself or themselves aggrieved, after exhausting the remedies provided by the operator, the whole matter shall be submitted to the adjuster, who shall be given every assistance by both sides in the investigation of the matter. After hearing both sides, the adjuster shall make a written statement of his findings of fact on such controversy, and such findings of fact shall be conclusive on everybody concerned.

XII—This memorandum shall remain in full force and effect up to and including June 30, 1920.

XIII—Within sixty days of the expiration of this period the President's Mediation Commission, or, in the event of its incapacity to act, the Secretary of Labor, shall call a conference of operators and workmen in this district with a view to a renewal of this memorandum.

XIV—Each operator or operating company ratifying the action of the committee of operators as shown by the terms of this memorandum shall signify his assent by subscribing his name either personally or by his duly authorized officers.

Executed at Los Angeles, the 9th day of September, 1919.

Signed:

J. L. SPANGLER,
E. P. MARSH,
HUGH L. KERWIN,
President's Mediation Commission.

Signed:

A. L. WEIL,
For the Committee of Operators.

General Specifications—Schedule A

Employees not entitled to 25c contingent pay for the year ending June 30, 1920, under the general specifications in this memorandum: Roustabouts; teamsters (two-horse); truck drivers (up to and including one ton); stablemen; boiler washers (no chipping, employed continuously); tank-car loaders; electricians (journeymen). Also employees whose wage may be determined by the Macy scale; or men who are paid 25c or more in excess of the wage stipulated for their class in this schedule. If less than 25c in excess of the wage stipulated for their class in this schedule is paid, such amount shall be credited on the 25c payable as provided in this memorandum.

Roustabouts are defined as all semi-skilled laborers, not hereinbefore classified, and are not entitled to the 25c contingent pay.

Common labor (unskilled labor) is defined to be that labor employed in other lines of business, and not peculiar to the oil business; shall consist of the following classifications, and of such other classifications as have not been enumerated in the schedule of semi-skilled or skilled classifications, viz.: Gardeners; janitors; watchmen engaged at the usual watchman's duties, and not required to bleed or gage tanks; gatekeepers; swampers; auto and truck washers; water carriers; weed cutters; ditch diggers; pick-and-shovel men; clean-up men; yard laborers; tank, tank-car and pipe cleaners, scrapers and painters; men loading and unloading cars, trucks or other vehicles; men distributing material in warehouses, yards, storehouses, or about the fields or plants.

Working conditions to continue as heretofore determined by the Federal Oil Inspection Board, and as follows: (a) Drilling crews: All drilling crews to remain on duty until relieved by succeeding crew, and are expected to work eight full hours per day; i. e.: There must be no cessation of activities, but a period of one-half hour shall be allowed during which the workers will, in turn, be permitted to eat their lunch or intermediate meal. All shifts to rotate once each month, in order that equitable working conditions may obtain. Preparations for work, as well as for leaving work, to be made on employee's time. (b) Pumpers and oilers: Where three shifts are employed, the preceding suggestions will apply. Where operations are conducted by two shifts, each shift will work eight hours on such reasonable hourly schedules as will best suit pumping conditions, conforming, so far as may be, with the working schedules of other departments. Where one shift only is employed, and on small prop-

SCHEDULE A—CLASSIFICATION AND WAGE SCALE OF OIL-FIELD EMPLOYEES

Occupation—	Daily Wage Rate Effective July 1, 1919
Driller (cable tools)	**$8.75**
Tool dresser (cable tools)	6.25
Circulator or third man	5.25
Driller (rotary tools)	8.75
Bit dresser (only when bits are dressed in rig)	6.75
Derrick man	6.25
Rotary helper (dressing bits in rig)	5.75
Rotary helper (not dressing bits in rig)	5.25
Head rig builder	8.75
Rig builders	7.75
Rig builders' helpers	6.75
Head well cleaner	6.75
Well cleaner helper	5.25
Head well puller	6.25
Well pullers	5.25
Engineers	5.50
Firemen, pumpers and oilers	5.00
Dehydrator Operators (employed continuously in operation of large retorts	5.50
Dehydrator operators (employed continuously in operation of large work; classified as pumpers	5.00
Head roustabout	6.00
Roustabouts (not entitled to 25c contingent pay)	5.00
GASOLINE EXTRACTION PLANTS	
First-class plants—	
First engineer	$5.75
Second engineer	5.50
Large booster stations—	
Engineer	5.50
Small booster stations—	
Engineer (operating booster station with or without other work)	5.25
Firemen, oilers, pumpmen, traptenders	5.00
FIELD EMPLOYEES	
Teamsters (two-horse) (not entitled to 25c contingent pay)	$5.00
Teamsters (four-horse)	5.00
Teamsters (six-horse and over)	5.25
Light truck drivers (up to and including one ton) (not entitled to 25c contingent pay	5.00
Light truck drivers (over one ton and up to three tons)	5.00
Heavy truck drivers (three tons and over)	5.75
Stablemen (split time understood; eight hours' work within any 10½ consecutive hours) (not entitled to 25c contingent pay)	5.00
Boiler washers (no chipping; employed continuously) (not entitled to 25c contingent pay	5.00
Boiler washers (where chipping is required, employed continuously)	5.25
Warehouse yard men (checkers)	5.00
Tank-car loaders (not entitled to 25c contingent pay)	5.00
Head garage repair man	6.50
Garage repair men	6.00
Garage repair men's helpers	5.25
Electricians (journeymen) (not entitled to 25c contingent pay)	7.00
Electricians' helpers	5.25
STEAM, GAS ENGINE, AND PUMP REPAIR MEN	
Repair man No. 1	6.25
Repair Man No. 2	5.75
Repair man's helper	5.25
FIELD SHOPS	
Acetylene welder	$6.50
Heavy fire blacksmith (employed principally in tool manufacture and at heavy forge work)	8.00
Light fire blacksmith	6.50
Other blacksmiths	6.00
Blacksmith helper (heavy fire)	5.50
Blacksmith helper (light fire)	5.25
Heavy hammer driver (2,500 lbs. or over)	5.50
Light hammer driver (under 2,500 lbs.)	5.25
Boilermaker	6.50
Boilermaker's helper	5.25
Machinist No. 1	6.75
Machinist No. 2	6.25
Pipe machinist (six inches and over)	6.00
Pipe machinist (under six inches; at bolt machines, and other work	5.75
Shop helpers	5.25

erties where daylight men are used, time may be divided to conform to most economical pumping operations and the securing of maximum production. (c) Field shops: All shop employees to work a full day of eight hours. (d) Daylight employees: All daylight men to work a full day of eight hours. Where work is situated at a considerable distance from the boarding house or other central station, daylight men will go to their work on company time, and return on their own time, with the proviso that loss of time to workers is not to exceed twenty minutes per day. (e) Stablemen: Split time for stablemen is permissible; it being understood, however, that no longer than eight hours' actual work shall be required within any ten and one-half consecutive hours. (f) Truck drivers and teamsters: Owing to the exigencies of the service, truck drivers and teamsters may be required to work such additional time over eight hours as may be necessary, and shall be paid therefor on a pro-rata hourly basis of the day's wage. (g) Eight hours will constitute a day's work for all workers, and longer hours of labor will not be permitted, even though the employer desires and the worker is willing to work additional time, except in cases of emergency when life or property are in danger, and except as herein otherwise specifically provided. In cases of emergency, overtime may be compensated for by the allowance of an equivalent amount of time at some subsequent date, unless otherwise mutually agreed upon.

Notes from the Texas Oil Fields

Pipe-line companies in Texas on Sept. 30 held in storage 16,917,989 bbl. of oil, according to the report of the Railroad Commission. Of this amount, 8,911,899 bbl. was owned by the pipe-line companies and 2,310,166 bbl. held for others. Unfilled storage capacity amounted to 5,695,932 bbl. Eight of the pipe-line companies reported.

The State of Texas has entered suit against the Texas Pacific Coal & Oil Co. for possession of 50.6 acres of land surrounded by producing wells situated in Eastland County. One-eighth royalty owned by the state is worth $250,000. The state is also suing for $500,000 damages for drainage of oil from under this land by the adjoining wells. Suit is based upon a question of mineral leases.

The bidding on one-half of the submerged oil leases to be sold at Goose Creek field by the State of Texas is finished. The highest price paid for any one tract was $3,527, by the Texas Washington Oil Co., for tract No. 5, of five acres. Individuals and small companies did all the bidding; the big producing companies did not participate, which was contrary to expectations.

The Sinclair Consolidated Oil Corporation has acquired the Wrightman oil properties in the Bull Bayou fields. These were known as the Johnson, Polly, and Hollingsworth leases, and, in addition to previous holdings, give the Sinclair corporation a large percentage of the producing area of the field. It is proposed to build a 250-mile pipe line, with daily capacity of 20,000 bbl., from the Louisiana properties to the refinery on the Houston Ship Channel, near Houston, Tex.

The Rowe Oil Corporation, it is stated, is negotiating with E. F. Simms Oil Co. for the sale of its entire holdings to the latter company. The property consists of 1,200 acres in the Homer field, and a one-half interest in the Shaw lease, now making 650 bbl. daily and with a gushing well capped awaiting pipeline facilities. The Rowe Oil Co. properties are owned jointly by the Western Oil Fields Corporation, of Denver, and W. H. Rowe, of Shreveport, La.

The White Oil Corporation has been recently incorporated under the laws of Delaware, with a capitalization of 1,000,000 shares, of no par value, of which 630,000 shares will be issued at once. Officers are: P. J. White, president, formerly senior partner of White & Sinclair; Thomas White, vice-president in charge of production, at present with the firm of White Bros.; Frank H. Bethel, vice-president in charge of finances, now first vice-president of the New York Telephone Co. Properties owned include 26,950 acres of oil and gas leases, two refineries, with daily capacity of 2,000 bbl. of gasoline, and 100,000 shares out of 160,000 shares of the Crown Oil & Refining Co. The latter company own leases on 87,500 acres of land, producing 5,000 bbl. daily of Gulf Coast crude oil; a 5,000-bbl. refinery on Houston ship channel, and a 1,000-bbl. refinery at Clarendon, Pa.

The board of directors of the Texas Company has recommended an increase in capitalization from $85,000,000 to $130,000,000; other recommendations made were that $42,500,000 of the new stock be offered to the present stockholders at par; that $2,500,000 of the new stock be sold to a trustee for allotment and sale at par to employees of the company; and that par value of the stock be reduced from $100 to $25 a share. The stockholders were asked to ratify these recommendations at a meeting held in Houston, Tex., Nov. 18, 1919.

The West Columbia field production for the fourth week in October averaged about 30,000 bbl. daily. The larger producing companies were the Gulf Production Co., 10,000 bbl.; Humble Oil & Refining Co., 10,000 bbl.; Texas Co., 7,000 bbl.; Crown Oil & Refining Co., 3,000 bbl.

The Freeport Sulphur Co. is making preparations to drill for oil on the McNeil tract, about ten miles west of Freeport near San Bernard River. The boarding house, bunk houses, and derricks are under construction.

The Texas Co. at West Columbia brought in No. 12 Hogg well recently, flowing over 5,000 bbl. a day.

The Sinclair Gulf Oil Co. has abandoned its No. 1 Norton well at Damon Mound at a depth reported to be over 4,200 ft.

The Humble Pipe Line Co. has nearly completed its new loading docks at Texas City. The tanker C. B. Ashe will take the first cargo of 90,000 bbl., on Nov. 1, destined for a New Jersey refinery. The oil to docks will be supplied from the company's tank farm at Webster, where fifteen tanks of 55,000-bbl. capacity each have been built.

The Terminal Oil Co. has had a temporary receiver appointed until after the court proceedings in which two notes of $150,000 and $75,000 are involved. The company owns properties at Humble field said to be worth $300,000.

The Sinclair Consolidated Oil Corporation has begun operations at its new refinery, situated on the Houston Ship Channel. Expectations are that it will be operating at a daily capacity of 4,000 bbl. in the near future. Much Mexican crude oil, brought directly to the refinery in tank ships, will be refined.

The Walker Oil Co. has completed the first unit of its oil refinery at Morgans Point, where it owns twenty-five acres of ground. The Southern Pacific R. R. is installing switching facilities. The ultimate capacity of the refinery will be 5,000 bbl. daily.

The Hoffman Oil & Refining Co. is doubling the capacity of its oil refinery on Houston Ship Channel, making it 1,000 bbl. daily.

The Deep Water Oil Refineries Co. in Harris County has purchased twenty-seven acres at Harrisburg, on the Houston Ship Channel, at a reported price of $1,500 per acre. The company will build loading, storage and trackage facilities here.

The Texas Co., in Jackson County, has leased a large acreage near La Ward from L. Ward, and has machinery on the ground to begin the drilling of oil test wells.

In Lampasas County, three new wells spudded in recently at Lampasas field. These are the White well, on Smith ranch; the Western Lampasas Oil Company's well, and the Waxa-Tex well of Waxahatchie Oil Co. Other wells being drilled are the Howell well, on the White ranch, 1,050 ft. deep; the Nelms-Marvin well, on McCrea ranch, 1,100 ft. deep; the Grooves well, 1,000 ft. deep; St. Mary's well, on Le Compte ranch, 900 ft. deep; and two wells of the New York Oil Syndicate, each about 1,300 ft. deep.

The Hull field production for the fourth week in October was about 3,800 bbl. daily. The major portion of production was made by the Gulf Production Co. and the Republican Production Co. The Empire Gas & Fuel Co. is doing deep drilling south of Dayton, where the No. 2 Jackson and No. 3 Welder wells are about 1,500 and 2,000 ft. deep, respectively.

Condition of the Petroleum Industry in Rumania.

Petroleum production in Rumania has reached about 80 per cent of its pre-war output, according to Lewis Van Norman, of the Bureau of Foreign and Domestic Commerce, who recently returned from an extended trip through that country. Some permanent damage was done to the petroleum deposits by the Germans, who, in their haste to secure maximum production, allowed the inundating of some of the deposits.

Dr. Van Norman found that during the term of German occupation, 1,500,000 metric tons of raw petroleum was taken from the Rumanian deposits by the Germans. During the period of occupation, the Germans did all in their power to provide for permanent German control of the Rumanian petroleum industry by a skillful organization of German enterprises, which already had more capital invested than did any other one of the foreign groups or the Rumanians themselves. After the armistice, however, the Rumanian government sequestered the German plant and holdings, and it is now operating them as a state monopoly.

The extensive pipe lines, which were just being completed at the outbreak of the war, were not damaged seriously by the Germans, and soon can be placed in operation. The development of petroleum deposits in Persia, and the fact that petroleum must bear heavy taxation for many years to come, are certain to hamper the expansion of the oil industry in Rumania, Dr. Van Norman points out in his report.

Ownership of Petroleum Lands in Colombia

The supreme court of Colombia is likely to annul the recent decree of the president of that republic in which proprietorship of the subsoil, without exception, is assumed by the nation, according to a report received by the Department of Commerce. Publication of the decree has aroused a storm of protest from the land owners in all sections of the country, many of whom have contracts with American companies permitting petroleum exploration.

In a formal report to the department, the American Consul at Barranquilla reviews the legal question involved and shows why he believes it is scarcely possible for the Supreme Court to do other than annul it.

Much harm already has been done, both within and without the country, by the decree, the consul reports, as it has weakened confidence in the sanctity of property rights. The general sentiment in Colombia, he says, is that it is imperative for the Congress to legislate definitely on the question, so that confidence may be restored. He points out that though Colombia possesses much promise for the petroleum prospector, the successes thus far obtained are not sufficiently striking to attract capital if there is any question as to proprietorship of the subsoil.

Treatment Costs of Oil Shales

James Duce, oil inspector of Colorado, recently returned from St. Louis, Mo., where he was sent by Governor Shoup to report on the Wallace process for treating oil shales. Mr. Duce states that shale containing 1 bbl. of oil per ton of ore should be treated for $1 a ton. The shale should not cost more than $2.15 per ton, delivered to the retort. By this process 30 gal. of 56° Beaume oil was produced. Assuming a price of 15c. a gallon for this grade of oil, there is a profit of $1.35 per ton, not including the byproducts obtained, such as lubricating oils and ammonium sulphate. He mentions that the technology of deriving lubricating and other byproducts from shale oil is as yet undeveloped, and that it is not justifiable to induce capital to invest in oil shales upon the assumption that these products are at present valuable. They have potential value, but the perfecting of their technology will be a slow process.

The Nipissing Mines Co., Ltd., of Cobalt, Ont., has an option on oil lands in Texas and has drilled to a depth of 1,500 ft., according to recent reports. It is planned to continue to a depth of 3,000 ft.

CORRESPONDENCE AND DISCUSSION

Letters From the Mining and Metallurgical Industry Dealing With Pertinent Subjects of Interest

The Domestic Production of Chrome Ore

The Washington correspondent of the Journal, in reporting Secretary Lane's conference on chromite, held last December, for the purpose of considering the chrome-ore situation, said that "All present recognized the objections that would be raised by Congress to a duty high enough to protect American producers of chrome ore." It was stated that such a duty would increase the cost of steel by 8 per cent over the pre-war price, and that this entire cost would be saddled upon the people of the United States, who, to avoid a possible loss of $1,000,000 to the chrome producers of the country, would be called upon to pay $17,000,000.

That this statement is inaccurate is apparent on a moment's thought. The total value of all the chrome ore used in the United States in any one year prior to the war was less than $1,000,000. It is not the desire of the producer that the consumer should pay $17,000,000, and if there is any likelihood of such being the case it might be a fit subject for Congressional investigation.

Because the distributor of chrome has been able to charge exorbitant prices for the mere reduction of the ferrochrome ore to the metallic state, it does not necessarily follow that a tariff will protect him in such a practice. A consideration of pre-war prices shows that the price paid for the chrome ore has little if any relationship to the prices charged for ferrochrome. It is likely that if Congress were to act, it would place such a duty upon the ore as would offset the increased cost of American production as compared to the cost of foreign ore. Such a policy would permit those manufacturers having a real preference for the foreign ore to continue to use it.

There seems to be an opinion that the chrome deposits of the United States could not supply our future market demands and that we should conserve our present supply by non-use and non-production. Although prior to the war such a contention might have been made without contradiction, our unprecedented development and production of chrome ore in the latter part of 1918 demonstrated to all who have taken the trouble to investigate the facts that, given a market for the ore which justifies the payment of a living wage to our American miners, they could and did meet the demands of our nation in the midst of war and at the same time piled up a reserve.

I do not mean to question the ability of our geologists to approximately estimate the tonnage of ore in any particular deposit when presented to them for their examination; or their ability to compile data as to the possible future production of the United States of those minerals having a commercial value and for which we have for years past made diligent search, but I do not believe they should be called upon to report the maximum amount of chrome ore we can produce until they have themselves made a search for the mineral or until the prospectors and miners of our country have been given an opportunity to investigate and report their findings. Both before and after the war, high-grade chrome ore on the Pacific Coast sold for less than an equal weight of coal or coke. Our prospectors were trained not to investigate chrome deposits.

There is today four times as much undeveloped ore in sight in the United States as there was prior to our entry into the war, not to mention the supply of mined ore on hand not worth the price of transportation to market. The greater part of this ore was brought to light within six months after our Government announced a policy of restriction of imports and the introduction of legislation for mineral control. Neither of these were carried out as expected. While we were in the thick of our fight and the chrome miners hard at work developing chrome, and at the same time keeping the market supplied, foreign ore was brought into this country.

The other measure which appealed to the miners as an inducement to develop chrome was the "War-Minerals Bill." The Government, after the signing of the armistice, did not put this bill into effect and denied relief to the chrome miners on the grounds that under the requirements a shortage of the mineral to be protected must be declared to exist.

Protection should be given the American miner, that we may relieve the feeling he has today that our Government is being exploited in the interests of capitalists, and that he is powerless to obtain relief.

Prior to the war, the United States was entirely dependent upon the chrome deposits owned or controlled by England and France. In 1914 we imported 74,686 tons of crude ore and produced but 591 tons.

In 1915 at the time when we were endeavoring to maintain peaceful relations with Germany, and President Wilson was doing all in his power to urge neutrality in our thoughts and actions, England placed an embargo on chrome ore being supplied to the United States and forced us to guarantee not to ship or permit to be shipped any chrome ore, or chrome products to the then neutral powers. Although in this instance it was not difficult to square our acts with our conscience, are we to admit and permit other nations, when they get into wars among

themselves, to deny us the right to market our steel products because some of these products contain a small percentage of chromium? We should never permit ourselves to be placed in a predicament that will permit a European nation to say to whom we shall and shall not sell our products.

But far more vital than to whom we sell is the question of our own supply. That we might rightly consider the danger of depending upon a foreign supply of this material so essential for war purposes we should give thorough consideration to the location whence we are obtaining this supply.

All the largest deposits as well as the largest amount of chrome ore used by the world today comes from New Caledonia and the east coast of Africa. These countries, situated in the South Pacific Ocean, are, figuratively speaking, in the back yard of Japan. In the event of a war with this nation Japan would attempt to place an embargo upon this important war mineral leaving Rhodesia and New Caledonia for the United States; and unless we were strong enough to keep the Japanese fleet from these waters we would not be able to obtain the chrome ore necessary for munition purposes to successfully carry on the conflict.

The chrome producers desire that a tariff be placed upon the importation of chrome ore equal to the difference in the pre-war cost of producing and delivering foreign ore to our markets and the pre-war cost of producing and delivering domestic ore to the same market. A tariff of 50c. to 75c. a unit on the chromic oxide of a ton of chrome ore is equivalent to 3½c. and 5½c. per pound of chromium. The present quoted price of chromium as used by our steel interests in the form of ferrochrome varies from 30c. to 50c. per pound; consequently such a tariff should produce but a slight increase in the cost of chromium to the consumer, and, as the amount of chromium used for the production of chrome steel does not as a rule exceed 3 per cent, such a tariff as above suggested should temporarily increase the price of chrome steel by not more than 2 or 3 per cent.

The chrome producers ask for a tariff to protect an infant war and a peace industry. Have we a right to limit our efforts for the production and utilization of chromium? Today, the interests in control of the ferrochrome markets which supplies all our Government should come to the assistance of their metallurgists. If the market prices are a criterion of costs, there is abundant field for improvement in their metallurgical practice. Is there any reason why their costs should not be made public?

A domestic production of the raw ore would broaden the field of production and by the co-operation and competition of our American metallurgists not only lower the price of ferrochrome but lead to the development of hitherto unworkable deposits, and in the application of our increased knowledge, broaden the economic benefits derived from the ore.

W. P. Lass.

Berkeley, Cal., Sept. 9, 1919.

Minnesota State-Owned Mines

An article appears in the Journal of Sept. 6 which gives interesting information about Minnesota state-owned iron mines. Not the least of this is the table showing "state-owned mines now exhausted." These latter number eight, and they have made aggregate shipments amounting to 1,736,000 tons.

It may be assumed that these mines are not "exhausted" in the sense that all their now merchantable ore is gone, for some of them were operated during a period when less care was observed than now in the conservation of ore in the ground and when there was much waste. But the losses as a whole are not great, and one may estimate that these mines averaged a tonnage of less than 300,000 each. They were, therefore, very small mines, as iron ore mines go. Are the remaining thirty active mining properties of the state as small? By no means. Without particularizing, it may be stated that these thirty contain approximately 150,000,000 tons, or 5,000,000 tons each, of ore now merchantable. Some of them comprise two or three hundred thousand tons only, but such properties as Missabe Mountain, Hill Annex, or Scranton, each of which has more than twenty million tons in reserve, bring up the average.

Many of the state leases have run more than half their allotted fifty years, and must be mined at speed to exhaust the ore during the life of the lease. This is especially the case with Missabe Mountain. The law under which state mineral leases were granted has been rescinded so far as the taking out of leases is concerned, and when such law is once more operative it will be on a far different royalty than the 25c. a ton now paid for ore mined. Probably it will be under some sort of sliding scale, based on quality, or ease of mining, or both.

The article referred to says that the state "is the largest single fee owner of iron ore deposits in the United States." Great as are its holdings, I question this statement. On the Mesabi Range alone the Great Northern Iron Ore Properties holds in fee the following mines: Mahoning, mine and reserves; Utica, Stevenson, Harrison, Lamberton Annex, North and South Uno, Enterprise, Harold, Thorne, Wabigon, North Star; and a half interest in the fee of the following: Leetonia, East and West Stevenson, Sweeney, Ann, Patrick, North Harrison, Warren, Mace, Hill-Walker; and in addition there are several reserves not opened, some not yet leased to operators, and the entire tonnage of the above mines and of these reserves is doubtless somewhat more than that in the ownership of the state.

It is well known that the Tennessee Coal, Iron & Railway Co. owns in fee tonnages vastly greater than those of the State of Minnesota. My present recollection is that the holdings of the Woodward Iron Co. are at least as large as Minnesota's, though my memory may be at fault here; and the ores owned by Witherbee, Sherman & Co. rank above those of the state.

Dwight E. Woodbridge, E. M.

Duluth, Minn., Sept. 27, 1919.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

War-Minerals Relief

Slightly more than $8,000,000 of the War-Minerals Relief Appropriation was unexpended on Oct. 31. Awards had been made to the extent of $343,195.67, representing 26 per cent of the amounts claimed. Expenses of the commission to that date aggregate $129,521.17.

The Chestatee award has been revised and increased by $3,000, bringing the total to $223,529.17, or 24 per cent of the amount asked. Other awards to date, with the class of claim and the percentage of the amount asked, are as follows: National Pyrites Chemical Co. (pyrites), $33,067.49, or 18 per cent of claim; C. T. Pinson (chrome), $212, or 12½ per cent of claim; Maryland Chrome Co. (chrome), $37,585.36, or 68 per cent of claim; Tynor, Pittard & Sloane (manganese), $186.40, or 9 per cent of claim; Oscar Reinholt (manganese), $1,456.25, or 58 per cent of claim; White Horse Mine (manganese), $468.97, which is 2 per cent of claim; Butte & Plutus Co. (manganese), $3,952.39, or 18 per cent of claim; Herbert W. Smith (manganese), $16,908.78, or 81 per cent of claim; Schafer, Atherton & Co. (chrome), $407.11, or 58 per cent of claim; L. B. Payne & Co. (chrome), $7,862.24, or 35 per cent of claim; Arata & Palmer (chrome), $302.20, or 11 per cent of claim; Playter Bros. (manganese), $1,046.43, or 17 per cent of claim.

Legislation to Liberalize Act

In view of an opinion rendered by the Secretary of the Interior in connection with proposed legislation to liberalize the War-Minerals Relief Act, the Committee on Mines and Mining of the House of Representatives probably will take no immediate action on the bill. In a letter to the House committe, Secretary Lane expressed himself as follows:

"It occurs to me that the most satisfactory way to treat this matter would be to wait until the work of the commission has progressed to a point where we can have definite information as to the claims which were rejected and the amounts to be paid under the existing law. If the matter were to be thrown wide open, and all claims considered, including requests for losses incurred through published reports, the appropriation of $8,500,000 would not cover the award, so that all must necessarily be scaled. On the other hand, if the commission be permitted to complete its work under the present law, it appears that a substantial amount will remain unused. By that time we shall have a knowledge of the situation which will enable Congress, perhaps, to establish a more liberal rule of award than that now existing, under which many of the claims now ruled out can receive attention. Up to this time, the War-Minerals Relief Commission has held hearings in 461 cases and has passed upon 347 claims out of 1,206 filed. If all the claims in which no direct request was made must be examined as to facts and questions involved, it will prolong the work of the commission very much and consequently delay the determination in those cases where a direct request was made."

The Position of Chief Engineer

The War-Minerals Relief Commission still is without a chief engineer. The position has been offered to several well-known mining engineers, but each has been forced by other considerations to decline the offer. W. R. Crane, of the staff of the Bureau of Mines, is filling the place temporarily, but it is the desire of the Bureau to place the engineering responsibility in the hands of an engineer who is not already in the Government service.

General Mineral-Leasing Bill

By vote of 169 to 39 the House of Representatives on Oct. 30 passed the General Mineral-Leasing Bill after four days of debate. The measure already had been passed by the Senate. The measure has been passed by the House four times, and twice by the Senate. Leasing legislation has been under active consideration in Congress for seven years. At the last session of Congress, when the measure was passed by both houses, six months was consumed before the conferees could reach an agreement. It was then near the close of the session, and the conference report was defeated in the Senate by Senator La Follette's filibustering tactics.

The measure is of the utmost importance, as it affects in a general way 700,000,000 acres of public land, and involves directly 6,500,000 acres of possible oil land, 70,000,000 acres of coal land, 2,700,000 acres of phosphate land, and 3,500,000 acres of oil-shale land.

An important feature of the bill is the unlocking of the resources of lands that have been withdrawn in California and Wyoming. In California, 40,000 acres of oil land were withdrawn, and in Wyoming about 10,000 acres of land were withdrawn after a considerable number of claims had been taken up. This resulted in extensive litigation, and as a result $25,000,000 has been impounded from the returns for the oil produced from these lands. The leasing bill will enable the Secretary of the Interior to settle these litigations and permit increased production of oil.

The bill was taken up under a special rule. The House committee had struck out all of the bill passed by the Senate and inserted a substitute.

Though many of the sections were unchanged, the action of the committee had the effect of simplifying the controversy over sections 40 and 41 of the Senate bill. Section 40 of the Senate bill, it was feared, would undo the dissolution proceedings against the Standard Oil Co. of New Jersey, and would have the effect of reassembling the dissolved units into single control. Section 41 provides that corporations engaged in producing or refining petroleum shall maintain the same price for their products where the stockholders of any such corporations own or control 25 per cent or more of the stock of any other such corporation. The opinion of the House committee was that the section is capable of great abuse and is loosely drawn. The two sections, it may be added, were attached to the bill in the Senate as a rider and were not considered by the Committee on Public Lands.

The bill as reported to the House provided that 10 per cent of the fund accruing from the leases is to be turned in to the Treasury of the United States to offset the expense of administering the act. The remaining 90 per cent is divided equally between the Reclamation Fund and the state in which the lands are leased. The 45 per cent for the states was intended to compensate them for their losses in tax values. This provision of the bill was changed on the floor of the House, however, so that 70 per cent of any moneys that may be paid on account of past production goes to the Reclamation Fund, 10 per cent to the Government, and 20 per cent to the state. Returns from future production are divided so that 60 per cent goes to the Reclamation Fund, 30 per cent to the state and 10 per cent to the Government. It is probable that these percentages will be changed in the conference. Many of the details of the changes made in the House are not presented in this article, owing to the certainty that additional changes will be made by the conferees.

The House left in the bill the provision of its committee that all helium gas is to be reserved for the Government. Representative Mondell dissented from this, saying, "We have become so hysterical about such matters that we are going to the extreme of over-protection. A certain amount of helium gas is necessary and important, but it is perfectly absurd to reserve the helium gas in all of the lands which would be affected by this bill."

Representative Sinnott, the chairman of the committee, pointed out, however, that experts had advised him it will be easy to separate helium from natural gas without in any way jeopardizing oil operations. The extraction of that gas is beneficial, it is claimed, as it results in a more inflammable natural gas.

Opening of Indian Lands

Location of mining claims on certain Indian reservations, and the leasing of those which may be found to contain deposits of metalliferous minerals, as provided in the last Indian appropriation act, was permissible after 12 o'clock noon on Nov. 1. The Secretary of the Interior has promulgated regulations to govern the prospecting and leasing. The Indian lands which will be subject to exploration under this act are included in the following reservations:

Arizona—Moqui Indian Reservation, Salt River Reservation, San Carlos Reservation, Walapai Reservation, Colorado River Reservation, Fort Apache Reservation, Western Navajo Reservation.

Arizona and New Mexico—San Juan Reservation, Navajo Reservation.

California—Hoopa Valley Reservation, Tule River Reservation, Fort Yuma Reservation, Morongo Reservation, Idaho Reservation, Fort Hall Reservation, Nez Perce Reservation.

Montana—Rocky Boy Reservation, Tongue River Reservation.

Nevada—Pyramid Lake Reservation, Western Shoshone Reservation.

New Mexico—Mescalero Reservation, Pueblo Bonita Reservation.

Oregon—Warm Springs Reservation.

Washington—Yakima Reservation, Neah Bay Reservation.

In laying out the original Indian reservations, not much was left to the Indians in the way of mineral resources. Since that time various sections have been detached from the reservations in order that such promising mineral supplies as existed could be exploited. As a result, the mineral wealth of the reservations included under the present act is not great. All of the reservations named have been covered by geologists of the U. S. Geological Survey.

Some gold occurs in the Moqui Reservation, but, perhaps, not in economic quantities. The San Carlos Reservation is in a copper region, but it is doubted if important deposits exist on the reservation itself. Some occurrence of asbestos is reported on the Fort Apache Reservation. Gold-bearing veins of no particular promise are reported on the Fort Hall Reservation. The Pyramid Lake Reservation offers some inducement to prospectors for copper.

The law providing for the leasing of these mines does not apply to oil, coal, potash, or phosphates. Coal deposits occur on a number of reservations, and though they are not leasable, they would be available as sources of fuel for mining operations.

Copper-Mining Bill

Representative Carl Hayden, of Arizona, has introduced a bill (H. R. 10433) to provide for the disposal of public lands in Arizona, New Mexico, and Utah containing copper at depth. The legislation proposed by the Hayden bill is designed to meet and deal with a condition to which the existing Federal mining laws are not, from the practical standpoint, applicable.

Many of the important copper deposits in the states mentioned do not occur as regular veins or lodes, but in extensive low-grade bodies, often underlying a heavy overburden of wash, conglomerate, or other non-mineral-bearing formation. To discover such underlying deposits deep and expensive drilling or shaft sinking is necessary, requiring months, and even years, for its accomplishment. Under existing law a discovery in such a drill hole or shaft could serve to validate, and vest possessory title to, only one claim, 1,500 by 1,600 ft., or an area of only about twenty acres, which is absurdly insufficient to justify the great outlay involved.

In the past the mining communities have attempted to meet the conditions by locating claims and doing annual assessment work in the overburden. Such claims, in most instances unsupported by any semblance of discovery, have been recognized by the communities as property, and bought and sold as such.

In many instances meager surface showings, not connected with the underlying deposits, have been claimed as discoveries and even made the basis of patent proceedings. In the early days the Land Department did not critically examine into the matter of discovery unless the question was raised by protest or contest, and large numbers of such claims were patented. This was the case at Bisbee, Ariz., where the ore formation occurs at a depth of 1,000 ft. or more. In later years the department has established the practice of requiring a detailed showing as to the character and quality of discovery claimed, and has made, through the field service, an investigation on the ground. As a result, the department has been confronted with the question as to whether inconsequential mineral showings in the overburden could be accepted as sufficient to constitute discovery, as in the case of the Rough Rider and other claims which were finally patented because it was felt that the previous patenting of similar claims had established a rule of property.

But, generally speaking, lands of the character contemplated by the proposed legislation cannot now be patented under the existing mining laws unless discoveries are made by deep drilling or shaft sinking. On the other hand, large areas of such land were in the early days patented under the non-mineral laws, under the rule which then prevailed that land could not be classified as mineral in character, or patented as a mining claim, unless mineral had been actually disclosed. In recent years, however, the department has adopted the rule that, through geological deduction as to underlying deposits, land may be classified as known mineral in character, and now declines to patent such lands under the non-mineral laws.

There are thus large areas of land in the four states mentioned which the Land Department recognizes, or would recognize, as being mineral in character, but which remain undeveloped because title thereto cannot, as a practical proposition, be acquired under the present mining law.

To justify the great expense of exploration by drilling or sinking shafts to a great depth, as well as the great outlay in working shafts, machinery, and equipment for actual mining operations, it is necessary that a reasonably large acreage be acquired or controlled.

The proposed legislation is designed to encourage the exploration and development of such lands by giving to any one who will undertake deep exploration work the right to control and acquire an area of not to exceed 1,280 acres (which is about the minimum area now held by any of the large porphyry copper mining companies), upon conditions carefully designed to prevent abuse of the privilege.

Mining Costs and the Federal Trade Commission*

The Wages of Capital Should Be Included in Costs of Production as Well as the Amount Paid to Labor

A TRUE diagnosis of the financial condition of our industry involves bookkeeping that states the real economic symptoms. In mining, as in all other productive business, production costs should express all the facts, but I am convinced that we have not yet reached that stage in our accounting methods. The annual reports of our largest mining corporations and the studies by the Federal Trade Commission alike fail to tell the whole story in their statement of production costs, which are made to include the wages of labor but not the wages of capital employed. The Federal Trade Commission, in its definition of cost, specifically excludes interest on investment, but can we do that in the world of realities? Does not the cost of a pound of copper just as truly include its share of the interest due on the bonds and the dividend due on the capital stock actually paid in—that is, wages paid to capital—as it includes the wages paid to the mine worker or the man in the smelter? Of course, neither payroll should be padded. Do not regard the definition of profit as simply an academic question for college professors to discuss: It is more a matter of fundamental concern to the men who are trying to build up the industry.

In the first place, such terms as "net earnings," "profit," "net income," "surplus," or "balance to surplus account," which appear on your financial sheets, are too optimistic in tone when the operating costs do not include any charge on account of the investment. The inference is too easily drawn that this surplus is available for profit-sharing between labor and capital. For example, the Federal Trade Commission report on copper is quoted in newspaper headlines as showing "28 per cent profit in copper," yet in this report the wage to labor is set forth as the first and largest item among the elements of cost, this item alone averaging 5 1-3c. a pound in 1918, but cost of capital is not included. The report, however, shows that the eighty-five copper companies discussed would require an average of 3c. a pound to pay 10 per cent on their actual investment, yet this 3c. does not appear in the 16c. of average cost, but instead it forms a part of the 8c. of so-called "net profit," which the unwary may regard as the actual difference between price and cost.

In the second place, I fear lest accounting which does not count all the costs may lead us to fail to appreciate the results of American engineering. Our mining engineers, backed up by red-blooded capitalists, are constantly lowering labor costs by increasing the investment in improved mine equipment. This means replacing the hardest part of labor with machinery—working dollars instead of men—so that your cost-keeping conceals the true state of things.

*Extract from an address to be delivered by Dr. George Otis Smith, Director U. S. G. S., before the American Mining Congress, Nov. 18, 1919.

Rapid Determination of Silver in Cyanide Solutions

BY J. E. CLENNELL

The following method, which I devised for the rapid determination of silver in cyanide solutions, has been checked both against the fire assay (usual method of precipitation with zinc dust, lead acetate, and hydrochloric acid, with cupellation of the resulting lead sponge), and against Clevenger's method (filtration under vacuum through a bed of zinc dust, the solution being delivered slowly from a dispensing burette, finally dissolving the precipitate in nitric acid and titrating with thiocyanate). The results obtained were, in general, higher than those given by the fire assay, and identical with those of Clevenger's method.

Reagents required:

1. Lead acetate (saturated solution).
2. Zinc dust as commonly used in cyanide plants.
3. Sulphuric acid, 50 per cent by volume.
4. Nitric acid, 50 per cent by volume.
5. Indicator for the final titration, being a contrated solution of ferric nitrate, ferric sulphate or ferric alum.

Standard solutions required:

1. Silver nitrate. This may be the regular solution used in titrating cyanide at the plant, or may be adjusted so that 1 c.c. equals a round number of ounces of silver per ton (or other desired unit) in the measured volume of solution used for the test. In the tests in which the method was checked, the solution contained 3.2617 gm. $AgNo_3$ per liter, so that 1 c.c. = 2.07 gm. Ag.
2. Potassium thiocyanate (sulphocyanide). This cannot be prepared by weighing an exact quantity of thiocyanate, but is easily adjusted to the required strength by blank titrations with the standard silver nitrate and diluted as required. In the experiments a solution was made, containing about 2.5 gm. KCNS per liter, and diluted to correspond with the standard silver nitrate.

Method (for poor solutions): Take 500 c.c. of the solution to be tested (if desired, 20 a.t. or 583 1/3 c.c. may be taken). Add 10 c.c. saturated lead acetate, 5 gm. zinc dust, and 25 c.c. sulphuric acid. Boil, settle, decant, and wash three times by decantation with hot water, without filtering. Dissolve the residue in 25 to 50 c.c. of nitric acid. Heat to boiling to expel red fumes. Cool. Dilute with about 100 c.c. of water. Titrate with standard thiocyanate and ferric indicator.

Remarks: For richer solutions 10 a.t. (291 2/3 c.c.), or even less, will suffice, the other reagents being reduced in proportion. The exact end point may sometimes be ascertained rather more accurately than by direct titration, if a slight excess of the KCNS be added and the excess cautiously removed by back titration with standard AgNO3 till the trace of red color is no longer observed after agitation and settling. Where the precipitate is bulky it is an advantage to allow it to settle and decant the bulk of the supernatant liquid into another vessel before making the black titration.

Advantages: This method has the advantage of not requiring any filtration whatever. On the other hand, a rather large volume of solution must be heated, whereas Clevenger's method avoids the necessity of artificial heat, at least in the preliminary or precipitating stage. Notwithstanding this, the new method proved the more rapid. In general, the sponge settles so rapidly that the process of washing by decantation occupies only a few minutes. Sulphuric acid is used instead of hydrochloric, to avoid the possible introduction of chlorides in the final solution, which would interfere with the thiocyanate titration.

Specifications for Reagents

Those who have experienced difficulties in operation attributable to impure chemical reagents are invited to write to W. D. Collins, Bureau of Chemistry, Washington, D. C., stating their experience, giving the use to which the reagents have been put, and suggesting, if possible, methods which would be satisfactory in determining the presence and amount of objectionable impurities. The American Chemical Society recently appointed a committee, of which Mr. Collins is secretary, to collect data regarding the quality of the reagents now on the market, and to draw up specifications. Insufficient knowledge on the part of the producer, both as to requirements and acceptable methods of testing, has been one source of the dissatisfaction heretofore experienced.

Indian Gold Production

The output of the Indian gold mines in September, 1919, amounted to 36,813 oz., the lowest monthly yield since May, 1902. The accompanying table, republished from "Financial Times," shows the monthly output in fine ounces since the beginning of 1915:

	1915	1916	1917	1918	1919
January	47,354	45,214	44,718	41,420	38,184
February	46,117	43,121	42,566	40,787	36,834
March	45,730	43,702	44,617	41,719	38,317
April	46,083	44,797	43,726	41,504	38,248
May	46,835	45,055	42,901	40,889	38,608
June	46,307	44,842	42,924	41,264	38,359
July	46,189	45,146	42,273	40,229	38,549
August	46,586	45,361	42,591	40,496	37,850
September	48,076	45,255	43,207	40,038	36,813
October	45,948	45,061	43,041	39,472	—
November	45,346	45,247	42,915	36,984	—
December	48,020	48,276	44,883	40,149	—
Totals	556,596	541,077	520,362	485,236	341,762

In September, 1919, the Mysore company made the largest production (12,502 fine oz.), followed by Ooregum (7,373), Champion Reef (6,848) and Nundydroog (6,263 fine oz.).

New South Wales Gold Yield for September, 1919, was 3,000 oz., valued at £13,000, as compared with 8,000 oz. valued at £32,000, in September last year, according to a report in Financial Times. The production for the nine months of this year amounts to 40,000 oz., valued at £170,000, as compared with 63,000 oz., valued at £268,000, for the corresponding period last year.

By The Way

Hands Across the Sea

A shortage of British technical experts, or some equally valid reason, has induced the S. Pearson Oil Co. to send five American geologists to Trinidad to explore and prospect some 200,000 acres of oil lands, according to the May issue of Petroleum. Development work is to cost about $250,000 a year and it may be presumed that the money will be judiciously expended.

New Fuel for Stubborn Fires

A Red Cross man, in Rumania, discovered a new kind of fuel recently, when his wits were put to the test of making low-grade lignite burn under his soup kitchens.

Wood and coal have been very scarce in Rumania since the German and Austro-Hungarian invasion and the traveling soup kitchen men, "goulash cannon operators," are sometimes hard put to it, to keep the pot a-boiling. John H. Nolan of Alpena, Michigan, Red Cross worker near Buzeu, found some of the rivers thickly encrusted with oil scum. One day a brilliant idea came to him.

Mr. Nolan and some of his assistants skimmed the oil off twenty or thirty square yards of the surface of a stagnant pool near their food station and then dropped the lignite briquettes into the oil. After the briquettes had soaked for two hours they were taken out and set afire. The lignite burned with a cheerful roar and now all other goulash experts working for the Red Cross are following the same method.

Civil But No Engineer

The following is excerpted from a bona-fide report on a lead property recently submitted in all seriousness to the American Metal Co. by a "civil and mining engineer":

The vein is a well-developed rift, subtending between genuine wall rocks, in a northerly and southerly course, in strict conformity with the direction of the primitive formation of the country, which is always necessary to constitute a true and genuine vein. There is a gallery or tunnel following longitudinally and horizontally for 700 ft. upon this vein . . . and there is no reason why the tunnel may not be continued northerly upon the vein to the company's north line about 5,000 ft. These facts are supported by prospect shafts, showing up the well-defined primitive formation of the country, as well as an extraordinary large vein having an average width of nearly or quite 40 in. Twenty-four in. in width in our western mines constitute a fine-sized lode vein, while 1,500 ft. is the limit of its length by law in Colorado, and other states and territories.

The main shaft in this mine passes down through the tunnel mentioned and subtends to a depth of 225 ft. below said tunnel. At this point the gangue material of the vein appears to change, as should be expected at such a depth. Flint with a small fissure of talc appears. These with other blue-stained materials, give tolerably good indications of the vein running in silver. This flint is little else than silica, tempered with alumin and altogether gives the materials a slight appearance of silver ore. Yet the whole may prove to be simply silicated flint, or dike, interjected at this point in the vein. . . .

It is accepted as true that metallic veins grow stronger as we go deeper. Then it follows that this 220-ft. level must have a heavier percentage of lead than the 83 ft. above it, which with numerous side fissures must average at least 24 in. in width of vein matter in sight. Growing schists caused many of those small side fissures which join the main vein further below. Calculated upon all the above facts which have been reasonably proved, this vein practically in sight must contain about 513,333 tons of ore.

After this ore has been taken out the mine will be increased in value beyond reasonable calculations that can be made at this stage of the work. No one has ever found the bottom of genuine lode vein. Generations will have passed away before it is exhausted. Gold lode veins are now being worked for profit that have only 15 to 20 in. width and not one of them will be abandoned so long as it produces $12 to $15 per ton, certainly not if it produces $20.

Cinderella Manitoba

"Manitoba is the Cinderella of the Canadian sisterhood, so far as the Geological Survey is concerned," writes "C. A. B." in the "Manitoba Free Press." "The survey seems to have a fixed idea that British Columbia is the land of promise, and to that favored province go geologists in gangs, while we get but a stray one. Of course, B. C. is attractive; the climate is in most parts delightful, the scenery grand in the extreme; possibly science there finds its surroundings more conducive to the correct attitude of mind for the unraveling of complicated stratigraphical problems. No doubt, no doubt. Yet poor old Manitoba is trying to tell the world that as regards mineral wealth she can do her bit, and more than her bit, if given a chance, and we should be so thankful if the powers that be would send us a nice flock of experts next season. Please do!

"In Ontario the dominion and provincial authorities seem to take delight in duplicating one another's work. P. C. Hopkins examines Larder Lake for the Ontario Bureau of Mines; soon after, Dr. H. C. Cooke hastens there to read its riddles for the dominion survey. A. G. Barrows reports on the Matachewan area, for Toronto, and forthwith Ottawa sends Dr. Cooke to investigate what is in the same map sheet. To those that have much shall be given.

"As for B. C. she is the petted darling of the G. S., if not its first love, certainly its latest. Eight parties have been assigned to the province during the summer, and a ninth took over the Mayo country, Y. T. J. J. O'Neill has been in charge of the party studying Salmon Arm, Portland Canal; B. R. McKay has investigated the placers of Cariboo; L. Reinecke passed weeks estimating the value of the soda lake between Clinton and Quesnel; the Slocan attracted M. F. Bancroft; the wild west coast of Vancouver Island yielded a wealth of information to V. Dolmage; S. J. Schofield seems to have discovered a new mining property which the Review calls "Brittania," S. C. McCann accumulated material for a map of the Bridge River country; and, lastly, Charles Camsell, the O. C. of the brigade, paid particular attention to the Coquilla section."

PERSONALS

F. W. Bradley has returned to San Francisco from Alaska and Idaho.

John W. Mercer returned from Europe during the latter part of September.

C. A. Burdick was in Ashland, Clay County, Ala., during September and October on professional business.

Alan M. Bateman, professor of economic geology in Yale University, has returned from a professional trip to Alaska.

Frank Williams, president, and **W. A. Chesterton,** director, of the Victoria Gold Mining Co., have returned to Boston after visiting the mine in Michigan.

S. S. Sorensen, general manager of the Braden Copper Co. at Sewell, Chile, who was in New York the latter part of October, sailed for Chile on Nov. 3.

S. Skowronski was in charge of the Anaconda Copper Mining Co.'s exhibit at the Fifth National Exposition of Chemical Industries held in Chicago during September.

Colonel U. G. Lyons, of the Cowango Refining Co., Warren, Pa., was elected president of the National Petroleum Association at the annual convention held at Atlantic City, N. J.

Carl O. Lindberg, mining engineer, with offices in New York and Los Angeles, representing an English company, recently visited the Coeur d'Alene district, seeking zinc property.

Donald H. Fairchild, mining and metallurgical engineer, returned to Denver from a professional trip to San Francisco and to the Kingman, Ariz., district, where he examined properties.

Ernest N. Patty, mining engineer for the Washington State Geologic Survey, has completed a geologic reconnaissance along the route of the proposed Methow-Okanogan tunnel, Okanogan County, Wash.

F. L. Estep, of the firm of Perin & Marshall, consulting engineers, New York, sailed on Oct. 2 for England, on the "Mauretania." **S. M. Marshall,** of this firm, intended to leave England for India about Nov. 1.

Fred Searls, Jr., of San Francisco, is in Wallace, Idaho. Mr. Searls' services have been secured by the Hecla Mining company in connection with the impending apex litigation with the Marsh Mines Consolidated.

J. Gordon Hardy, formerly consulting engineer of the American Smelting and Refining Co., has resigned his position to return to Mexico, where he was engaged in private work prior to the revolutionary troubles.

A. E. Ring, who had charge of the operations of the American Smelting and Refining Co. at Creede, Col., has been transferred to Leadville, where he is at present on the staff of the Yak, a subsidiary of the company.

Hugh A. Stewart, general manager of the Chiksan Mines, Chiksan, Korea, has returned to the United States because operations have been suspended at the property. Mr. Stewart will spend the winter in Denver.

Joseph Daniels has returned to the faculty of the University of Washington College of Mines as associate professor of mining and metallurgy. For the last year Mr. Daniels has been connected with the Sydney Junkins Engineering Co., Vancouver, B. C.

Harris & Ewing
A. G. WHITE

A. G. White, who has served for a number of years as the economist for the Bureau of Mines, has resigned to accept a professorship with the University of Pennsylvania. He will serve as an instructor in economics as applied to business.

Joseph P. Connolly, of Villa Beach, Cleveland, has been appointed professor of mineralogy in the South Dakota School of Mines. Professor Connolly has been lecturing on economic geology at the University of Missouri since his discharge from the Army in January.

Leon J. Pepperberg, Frank W. Reeves, and **Carlton Meredith,** geologists and engineers, announce the removal of their offices from Mineral Wells, Tex., to Great Southern Life Building, Dallas, Tex., and Mrs. Dan Waggoner Building, Fort Worth, Tex.

M. H. Merriss resigned from his position with the Raritan Copper Works in September and is now with the Nicols Copper Co. **E. J. David** succeeds Mr. Merriss as head of electrolytic department, and **M. H. Mosher** has been placed in charge of the silver refinery.

J. Leonard Replogle, former Steel Director of the War Industries Board, was decorated with the Belgian Order of the Crown at the order of King Albert in recognition of his work during the war. The decoration was delivered by a Belgian Vice-Consul for Baron de Cartier, the Belgian Ambassador.

J. B. Tyrrell, of Toronto, Canada, arrived in Winnipeg on Oct. 30 from a professional trip in Manitoba, after being delayed for a week by the freezing over of several streams and lakes. The Aero Club of Winnipeg sent out an airplane piloted by Captain Thompson and carrying J. D. Perrin, an official of the Gold Pan Mines, Ltd., to bring Mr. Tyrrell back, but he arrived in Winnipeg on the same day the plane departed.

C. K. Brown, of Kingwood, West Virginia, and **J. A. Graft** have been named instructors in the mining extension bureau of West Virginia University. Mr. Brown will have headquarters at Wellsburg, Brook County, and Mr. Graft at Beckley, Raleigh County. **A. C. Callen,** head of the department of mining, superintended the opening of the extension office at Beckley, and **R. Z. Virgin,** assistant director, left for Wellsburg to superintend the opening at that place.

SOCIETIES

Inter-Professional Conference will be held in Detroit, Nov. 28 and 29. Representatives of the engineering, legal, educational and medical professions will be present. The organizing committee consists of Calvin W. Rice, secretary, American Society of Mechanical Engineers; Arthur D. Little, chemist, Cambridge, Mass.; E. J. Mehren, "Engineering News Record," New York, and Henry W. Hodge, bridge engineer, New York. The office of the committee is at 56 West Forty-fifth St., New York. The meeting will be held in Detroit at the Hotel Statler.

American Society of Mechanical Engineers will hold a joint meeting with the American Society of Heating and Ventilating Engineers on Dec. 11, at which the following paper will be presented: "Oil as a Fuel," by Henry Thomas, combustion engineer, Sun Co.,

and E. H. Peabody, vice-president, Babcock & Wilcox Co., and on Jan. 8 a paper, "Air Cleaning by the Cottrell Electrical Precipitation Process," by P. E. Landolt, Research Corporation, New York, will be presented.

National Research Council, division of industrial research, is arranging for the formation of a co-operative association to plan and support fundamental researches in alloys. It is believed that a co-ordinated effort under the general guidance of the council of specialists representing both the manufacturers and users of alloys can produce results of great importance. The success of the National Canners' Association and the Malleable Iron Manufacturers are examples in other industries. It is planned to create a special scientific staff composed of a director and assistant director of research and a group of scientific investigators and technical experts who shall give their whole time to the work. To finance the organization each member of the co-operative association will pay $1,000 a year, and all contributing members, who may be either manufacturing or using individuals, firms or companies are to benefit alike by the results of the researches.

OBITUARY

W. D. Weaver, one of the charter members of the American Electrochemical Society, died at his home in Charlottesville, Va., on Nov. 2, 1919, aged 62. Mr. Weaver was among those who started "Electrochemical Industry" in 1902, being one of the five original stockholders. He was editor of the "Electrical World" for fifteen years, and exercised considerable influence upon the development of electrochemistry by the prominent place he gave to it in that journal.

INDUSTRIAL NEWS

Albert P. Hill Co., Inc., announces the removal of its offices from the Peoples Bank Building.

Federal Motor Co., Detroit, Mich., recently published an issue of "Traffic News" containing information relative to motor vehicles and costs of operation.

The Chicago Pneumatic Tool Co. has removed its Birmingham office from 801 Brown Marx Building to 1925 Fifth Ave., North, where a service station with a stock of pneumatic tools, electric tools, air compressors, oil engines, rock drills, and repair parts will be maintained.

Horace G. Cooke announces the organization of Horace G. Cooke, Incorporated, to design and market for the National Marine Engine Works, Inc., a complete line of rotary compressors, gas exhausters, and pumps. Mr. Cooke also announces his withdrawal from the Connersville Blower Co., after twenty years as Eastern representative.

The Electric Furnace Co., Alliance, Ohio, has recently issued three pamphlets. The first, 7 B, describes the company's standard 105-kw. brass melting furnace; the second, 17 B, gives details of a special furnace for rolling mills, designed to allow pouring the metal directly into the molds; and the third, 13 B, is a discussion of various electric non-ferrous metal furnaces, which was delivered at the Boston meeting of the American Institute of Chemical Engineers.

TRADE CATALOGS

Davis Bournonville Co., Jersey City, N. J., has issued a circular describing a decarbonizing outfit for burning out carbon deposits in gas engine cylinders.

Magnetic Pulleys and Separators. Magnetic Manufacturing Co., Milwaukee, Wis. Bulletin P.; 6 x 10; 10 pp., illus. Describes high-duty ventilated magnetic pulleys for use in crushing plants and foundries.

Boiler Room Records. Yarnall Waring Co., Philadelphia, Pa. Catalog; 6 x 9, 22 pp., illus. Describes the Yarway Lea meter for measuring feed water, which is a continuous self-recording instrument showing fluctuation in steam output as it occurs.

Modern Rock Crushing Plants. Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Bulletin 1141; 8 x 10½, 44 pp., illus. Describes the machinery and appliances used in the equipment of a rock-crushing plant, including rock and ore breakers, screens, and elevators.

Drop Forgings. Page Storms Drop Forge Co., Chicopee, Mass. Catalog, 17th Edition; 5 x 8; 80 pp.; illus. Describes numerous types of wrenches and various processes and machines used in the manufacture of the material. Tables of prices and dimensions are also included. Crank handles, thumbscrews, bolts and similar special drop forgings are also described.

NEW PATENTS

U. S. patent specifications may be obtained from the Patent Office, Washington, D. C., at 5c. each.

Alkali Metals—Process of Producing Alkali Metals From Their Chlorides. Horace Freeman, assignor to American Cyanimid Co. (1,319,148; Oct. 21, 1919.)

Aluminum Alloys—Method for Manufacturing. Arrigo Tedesco. (1,318,-702; Oct. 14, 1919.)

Blast Furnaces — Apparatus for Charging Blast Furnaces. Tokuji Kawai. (1,319,005; Oct. 14, 1919.)

Cable Attachment. Charles J. Kienzle, assignor to Jeffrey Manufacturing Co. (1,315,969; Sept. 16, 1919.)

Concentrator Table. Albert E. Fish. (1,319,383; Oct. 21, 1919.)

Copper—Process of Extracting Copper from Ore. Robert Seaver Edwards. (1,319,858; Oct. 28, 1919.)

Crushers and Pulverizers—Feeder For. Paul S. Knittel, assignor to American Pulverizer Co. (1,318,389; Oct. 14, 1919.)

Drill—Power Drill. John M. Roberson. (1,315,422; Sept. 9, 1919.)

Drill—Rock Drill. William A. Smith, assignor to the Denver Rock Drill Manufacturing Co. (1,318,617; Oct. 14, 1919.)

Drill Bit—Mining-Drill Bit and Coupling. David J. Williams. (1,318,-940; Oct. 14, 1919.)

Drilling — Rock-Drilling Apparatus. Sten Rudberg. (1,319,968; Oct. 28, 1919.)

Drilling Apparatus. William A. Smith, assignor to The Denver Rock Drill Manufacturing Co. (1,318,618; Oct. 14, 1919; 1,319,975; Oct. 28, 1919.)

Electric Furnace. Carlo Masera. (1,-320,884; Nov. 4, 1919.)

Ferrosilicon — Process of Making Ferrosilicon and By-Products. Joseph E. Johnson Jr., deceased. (1,318,763; Oct. 14, 1919.)

Fuel—Distributer for Comminuted or Pulverulent Fuel. Daniel Goff. (1,-318,375; Oct. 14, 1919.)

Fuel—Feeding Apparatus for Pulverized Coal. Charles Willis Kinter. (1,319,348; Oct. 21, 1919.)

Fuel—Feeding Device for Pulverulent Fuel. Karl Hjalmar Vilhelm von Porat. (1,319,193; Oct. 21, 1919.)

Fuel—Plant for Feeding Pulverized Coal to Furnaces. Joseph E. Kennedy. (1,320,367; Oct. 28, 1919.)

Furnaces—Shield or Auxiliary Wall for Furnaces. John O. Griggs. (1,320,-386; Nov. 4, 1919.)

Iron Alloys—Process for Producing Iron Alloys. J. E. Johnson, Jr., deceased. (1,318,764; Oct. 14, 1919.)

THE MINING NEWS

New York, November 8, 1919

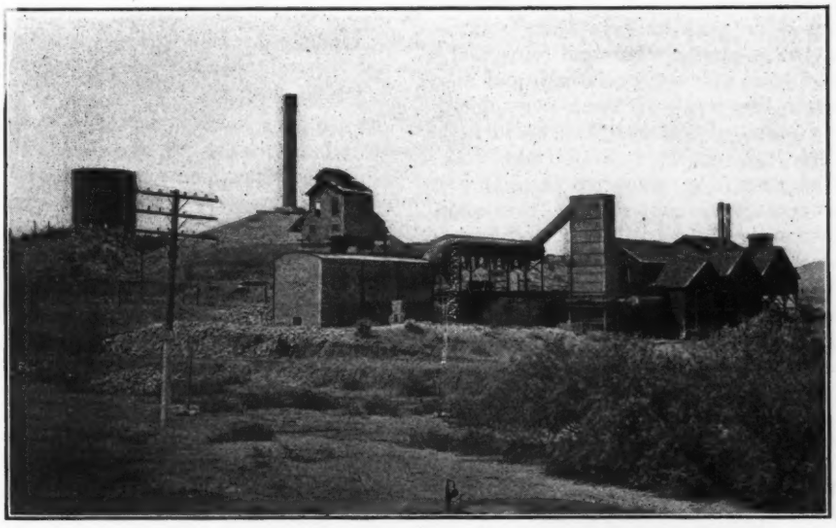
Utah Consolidated-Utah Apex Suit Opened

The apex suit brought by the Utah Consolidated Mining Co. against the Utah Apex Mining Co., both with properties at Bingham Canyon, Utah, opened in Salt Lake City, on Nov. 3, in the U. S. District Court, before Judge Tillman D. Johnson. Prominent geologists and engineers have been retained by both sides. Among these are Waldemar Lindgren, H. V. Winchell, James Furman Kemp, and Albert Burch. Both sides have been preparing the case for a number of months. A large amount of unproductive underground work has been done by both parties to the issue, to demonstrate the various points to be debated. Judge Curtis H. Lindley, of San Francisco, author of "Lindley on Mines," is associated with former judge John A. Marshall and William E. Colby, of San Francisco, for the defense.

New Furnace at Benson, Ariz., Ready to Blow In

The Arizona Smelting & Power Co. was organized late in 1918 for the purpose of taking over an old smelting plant at Benson, Ariz., which included a never-used 250-ton copper blast furnace. Charles E. Goetz is president of the company and Martin Fishback, general manager. The plant has been thoroughly overhauled and is now practically ready to blow in. The company has experienced much delay in having its railroad spurs and switches approved by the Railroad Administration. It is now expected that this essential work will be completed in the near future, when operation will begin.

The company expects to draw ore from Johnson, Patagonia, Helvetia, and other districts. It has an old slag dump of good fluxing material which it considers a valuable asset. The plant is shown in the accompanying photograph. The stack in the background was raised into its present position in a rather interesting manner, an account of which is given in the "Journal" of July 19 last, under the title of "Solving a Stack-Raising Problem."



PLANT OF ARIZONA SMELTING & POWER CO., BENSON, ARIZ.

International Ore Co. Reorganized in Liege, Belgium

The reorganization of the International Ore Co. was effected in Liege, Belgium, on Aug. 12 last. The new company is known as the International Ore & Smelting Co., its address being Apartado 136, Saltillo, Coahuila, Mexico. It is announced at the same time by F. E. Salas, general manager, that the new company has arranged with the Compagnie Metallurgique Franco-Belge de Mortagne, S. A., and with the Societe Royale Austurianne des Mines to establish a steamship service between Tampico and Amberes. The latter companies have agreed to buy in Mexico with the technical supervision of the International Ore & Smelting Co. the zinc ores, carbonate and sulphide, that they need for their plants in France and Belgium. A group of engineers and workmen, specialists in making zinc, arrived at Saltillo, Chi., in September, and operations have been fully resumed at the new smeltery. This will soon begin the work of producing zinc ingots.

For some time the company has been engaged in erecting two Belgian distilling furnaces of 300 retorts each, which will be fired with petroleum. It has also completed an eight-grate furnace to make zinc oxide direct from ore. The equipment also includes a 30-retort distilling furnace, said to be the first zinc-distilling furnace in Latin America.

Daniel Guggenheim Discusses Industrial Unrest

In a recent interview published in the "New York Times" Daniel Guggenheim made the following suggestions toward solving the problem of industrial unrest:

Congressional legislation chartering both employers' and employes' organizations involved in interstate business.

Passage of a law preventing strikes or lockouts without full investigation and report.

Laws making decent working conditions and hours of labor, which have been voluntarily put into effect by some employers, to be made compulsory.

The use of moral suasion to force arbitration; employers and employees to be compelled to respect their agreements, and the appointment of a commission to carry out this program.

"I suggest that Congress pass legislation along the following lines," said Mr. Guggenheim: "First, charter both the employer engaged in interstate business and organizations of employees involved in such business, and that at the same time those measures for decent working conditions and hours of labor which have been put into effect voluntarily by some employers be translated into laws and be made compulsory; that a law be passed against strikes or lockouts without full investigation and report; that all moral suasion be used in forcing arbitration in the case of industrial disputes, and that both the employer and employee be compelled to respect their agreements.

"I believe the best way to carry out this program would be for Congress to appoint a commission with wide powers, this commission to consist of an equal number of representatives of employers

and employees, and that the employers' representatives be appointed by Congress upon recommendation made by such semi-official bodies as the United States Chamber of Commerce.

"This commission should have power to revoke licenses given to industrial concerns or to labor organizations, and provide for investigations before strikes or lockouts, and to bring pressure to bear to permit it to arbitrate differences. This commission should be non-political, and the members should be appointed to continue in office for life, subject to certain limitations, similar to those affecting the duties of our Supreme Court.

"They should have all necessary authority and should be strengthened in every way possible, and they should have ample funds to carry on their work of investigation, to employ experts and to make recommendations to Congress on industrial matters. The members of the commission should receive salaries sufficient to permit obtaining the highest possible grade of men, and everything should be done to build up its authority and influence.

"I believe it is of the utmost importance to provide for our taking, in some such way, a middle-of-the-road progressive policy in dealing with industrial problems so that we will be able to stabilize industry, encourage initiative and enterprise, and at the same time build up a self-respecting, healthy and happy class of employees, all of whom will feel that their rights are carefully safeguarded, and that the avenues of opportunity for betterment of their financial condition are not closed, but that every one has an opportunity of reaching a level commensurate with his own ability, and that at no time will any one who is willing to do an honest day's work be unable to earn a decent living for himself and family.

"My views in this regard cannot be better expressed than in the words of Premier Lloyd George of England in commenting on their recent railroad strike: 'The strike proved that this is a really democratic country where public opinion must prevail. . . . Prussianism in the industrial and economic world must not prevail. . . . The nation means to be strong, firm, and just, but always master.'"

Quincy Company, of Michigan, to Re-work Old Sands

The Quincy Mining Co., of Michigan, plans to spend $500,000 on a plant for recovering copper from the old Pewabic and Quincy sands on the shores of Portage Lake. Work will begin in 1920, according to an announcement made by the company to the business association of Hancock. This is a substantial endorsement of the operations which the Calumet & Hecla Mining Co. has conducted for a number of years at the Lake Linden plant. The original Quincy smeltery stood on the shore of Portage Lake. It is known that the Quincy company has refused to renew leases that were made to a number of business houses using the water front. It is also planned to regrind the sands at Mason.

The Birmingham Situation

The end of October found the Birmingham district no more affected by the steel strike than at its beginning. In fact, some companies report an increase in production in October compared with any of the summer months. Labor seems to be contented, and the attendance at union meetings has decreased rather than increased. No prediction is made, however, as to how long this condition will prevail. Practically all of the large iron mining companies in this district own their own coal mines and are dependent upon them for domestic coal for their camps as well as that used in their steam and power plants. The coal miners of the district are well organized, and although the men of some companies have voluntarily stated they would not strike, it is expected that, if the coal strike does take place on Nov. 1, as announced, the majority of the coal mines in the district will be closed down. As a result the various iron mines and furnaces will shut down as their reserve stocks of fuel and coke become exhausted. Some mines and some furnaces have good supplies of reserve coal and coke that will carry them through the strike, which it is believed cannot be of long duration.

Interest in the Premier Bought by Guggenheims

The Guggenheim interests have purchased a two-fifth interest in the Premier mine, in the Salmon River district of British Columbia. This is the property that was bonded by H. R. Plate and associates, of New York, who, after driving 1,600 ft. of shafts and tunnels, abandoned the option. The property was then bonded by R. K. Neill, of Spokane, and W. R. Wilson, manager of the Crow's Nest Pass Coal Co.; A. B. Trites, and W. Wood, of Fernie, B. C., who found ore in the second round of shots exploded. From that time they have had one continuous round of successes. It is estimated that over 1,000,000 tons of ore assaying on an average $30 per ton in gold and silver has been proved above the bottom level, where the vein is stronger and richer than at any other point developed.

The following are the officers of the new Premier company: R. W. N. Wood, Fernie, B. C., president; H. A. Guess, New York, vice-president; Minor Keith, New York, second vice-president; W. E. Norris, New York, secretary; and L. A. Chaplin, New York, treasurer. During the coming winter six specially designed tractors will be employed to draw the ore over the snow from the mine to tide-water.

Goldfield Development's Plans

The Goldfield Development Co. plans to put its 1,000-ton mill on an operating basis of 2,000 tons a day, according to A. I. d'Arcy, general manager. Work on mill repair and construction has already begun. The mill is 85 per cent complete at present for handling 650 tons; completion of the remaining 15 per cent requires thirty days. Approximately $27,000 has already been spent on this work. The cost of increasing the capacity from 1,000 to 2,000 tons and changing to a simple cyaniding process is estimated at $205,000, to secure which the company has been refinanced. It is proposed to increase the capitalization from 2,500,000 to 4,000,000 shares.

The company holds under a five-year lease all properties of the Goldfield Consolidated Mines Co., consisting of all mining properties in the district and the latter company's mill. It is planned to decrease operating costs by working the deposits on a large scale for low-grade ore. Careful sampling of the Combination and Red Top mines showed 1,500,000 to 2,000,000 tons of $5.60 ore available down to the 380 level. A caving system will be used in place of square setting. The ore will be drawn off through raises to the 380 level and hauled by electric locomotives to a shaft 300 ft. east of the vein. Thus a reduction in operating costs of about $2 per ton is anticipated. It is estimated that mining and milling will cost $3.15 per ton as against $5.17 spent in 1917 by Goldfield Consolidated.

President Names Delegates to American Mining Congress

Ten delegates at large to the American Mining Congress, to be held in St. Louis, Nov. 17 to 21, were appointed on Nov. 1 by President Wilson. Officials of the Congress announced that an industrial conference would be held in connection with the meeting in an effort to work out solutions of the labor problems confronting the country. The delegates named by the President were: Emmet D. Boyle, Governor of Nevada;

Albert E. Carlton, of Cripple Creek, Col.; Jerome J. Day, of Wallace, Idaho; Alva C. Dinkey and Daniel B. Wentz, of Philadelphia; Van H. Manning, Director of the U. S. Bureau of Mines, and George Otis Smith, Director of the U. S. Geological Survey; W. A. McCutcheon, of Pittsburgh; Francis S. Peabody, of Chicago, and F. B. Richards, of Cleveland.

Uintah Basin, Utah, to Be Tapped by New Railroad

Work on the projected railroad into the Uintah Basin of Utah is planned to begin in the early spring. The basin is rich in various hydro-carbons, including elaterite, gilsonite, and ozocerite, having produced more of this material than any other part of the country. A large sum of money will be needed for the project, which is endorsed by Governor Bamberger and the Commercial Club of Salt Lake City. Salt Lake will furnish most of the money required; Utah County, and Uintah and Duchesne counties will also contribute.

Hopp-Ward Litigation Settled

Cable advice from England states that the Privy Council has given a verdict in favor of R. T. Ward, of California, in the case of Hopp vs. Ward, which involved the ownership of the Bullion mine, near Quesnel Forks, B. C. The property, consisting of 1,200 acres of placer land, was originally taken up by C. P. R. officials, who spent $3,500,000 in development and equipment and recovered $1,500,000 in gold, and then sold to the Guggenheims who formed the Cariboo Gold Mining Co. The company spent an additional $500,000 and sold to Ward. Hopp, a local man, "jumped" the property in 1913 on a technicality, and the case has been before the Executive Council and the Supreme Court, both of which favored Hopp, and the Court of Appeals and the Privy Council, both of which also favored Hopp. The litigation has cost Ward $15,000, only a small part of which he expects to recover from the Hopp interests, the Quesnel Forks Gold Mining Co.

Smoke-Nuisance Investigation

Data regarding the smoke nuisance recurring with the winter months in Salt Lake City are being collected with a view to its control. The work is being done by Osborn Monnett, of Chicago, in co-operation with the local station of the U. S. Bureau of Mines and the engineering department of the University of Utah. The territory to be covered has been divided into districts and facts gathered will be recorded on Ringleman charts, to afford a basis for calculations as to tons of soot deposited per annum for each district. The investigation will be completed in May or June next, and a bulletin published giving the data collected, including suggestions regarding an effective smoke ordinance and the establishing of a smoke inspection department.

Utah Potash Company Extending Holdings in Tooele County

The Utah Salduro Co., which is understood to be a subsidiary of the Solvay Process Co., has applied for patent on 1,543 placer claims at and near Salduro, in Tooele County, 112 miles west of Salt Lake City. The area for which patent is sought embraces 30,657 acres. Since August, 1916, when the first ground was located, this company has been operating a plant for producing potassium and magnesium chlorides from brines of the great salt beds of western Utah. The brines are collected in trenches, evaporated in solar vats, and later refined.

The acreage of salt lands applied for is the largest for which patent has ever been applied in Utah. About 125 miles of trenches have been dug. In the last three years the company has produced over 11,000 tons of 80 per cent potassium chloride. The present capacity of the plant is given as fifteen tons daily of potassium chloride of the same grade.

Further Action in Case of Ross vs. Burrage

The motion filed by Louis Ross to amend his bill of equity against A. C. Burrage was heard in Boston, Oct. 27, by Justice Jenney, of the Supreme Court, with Thomas W. Proctor as master to hear additional evidence. Ross wishes to show that when Burrage induced him to sign the agreement of May 6, 1912, a modification of the agreement made in 1910, relative to the investigation of mining properties in Chile, Burrage had already parted with his rights and interest in the mine by assigning the same to Daniel Guggenheim. He alleges that the profits received by Burrage from Guggenheim amounted to $25,000,000. He contends that he is entitled to be paid 5 per cent of the profits under original agreement, amounting to $1,200,000. Ross was recently awarded $100,000 in settlement of his claim against Burrage.

New Company Organized to Work Mexican Mines

The Sonora Mexican Silver Mines, Ltd., has been organized in London to acquire and work silver mines at Minas Nuevas, Sonora, Mexico, including a thirty-stamp mill. The property is 330 miles south of Nogales, Ariz., and consists of about 125 acres of land held under the following titles: La Purisima Conception, Mina Zambona, Continuacion Zambona, San Antonio, Fortuna, and Zambona No. 3. The capital of the new company is £85,000 in £1 shares.

Development at Hampton Plains, Western Australia

The original discovery of gold which was made during September last at Hampton Plains, twenty-two miles south of Kalgoorlie, in Western Australia, was made in Block 50, now known as the Celebration lease. This lease is under option to a syndicate consisting of the following: J. McDermott, general manager of the Ivanhoe mine, Kalgoorlie; R. Hamilton, general manager of the Great Boulder mine, Kalgoorlie; J. W. Sutherland, general manager of the Golden Horseshoe mine, Kalgoorlie; P. Fitzgerald, general manager of the Oroya Links mine Kalgoorlie; and A. Francis, attorney for the Hampton Plains Co. The lease cost $125,000 and is being vigorously prospected. A shaft has been sunk 100 ft. and a crosscut at 50 ft. showed the lode to be 25 ft. wide and worth $38.40 per long ton. At the bottom of the shaft the ore is worth $24 per ton. North of this find, there is a lease which stands under option to an Adelaide (South Australia) investor where good values have been discovered in a lode near the surface, but no further prospecting appears to have been done. Six miles south of the find on Block 50, several parties have found gold on Block 48, and Slavin & Eivers, who have called their lease the Lily of the Valley, have a large sulphide formation stated to assay 1 oz. per ton. Large numbers of leases have been pegged, and options are being freely taken, but further action is waiting the publication of fuller details of the values in the Celebration lease.

At Broad Arrow, which is north of Kalgoorlie, some rich ore has been found at Borland and Rundd's Oversight mine, which is under option to D. L. Doolette, of Melbourne, Vic. The present owners have received $77,750 from 450 tons, and from the Tara lease, which adjoins it on the north, $100,000 has been won from 500 tons.

Bendigo Amalgamated Goldfields Production

The reported output of the Bendigo Amalgamated Goldfields for the four weeks ended Sept. 9 was 8,554 tons for a yield of 5,097 oz. The highest grade ore was from the Constellation mine, 1,295 tons averaging 144s.

PROGRESS OF MINING OPERATIONS

Important Events of Interest Condensed and Classified for Easy Reference

ALASKA

OPERATIONS IN VALLEY OF KUSKOKWIM RIVER

The first gold dredge on the Kuskokwim River has been installed on Candle Creek, and after delays incident to the erection of new machinery, has averaged about $6,000 a day during July and August. The dredge is owned by the Kuskokwim Gold Mining & Dredging Co. of Aniak, Alaska, and was placed on the upper end of the creek to work down-stream.

W. Y. Fisher, of Aniak, and associates are prospecting a group of placer claims on Marvel Creek, a tributary of the Aniak River, with a view to installing dredging machinery if the results justify. The prospecting is being done with a gasoline drill. E. W. Parks, of Georgetown, Alaska, has a crew of men at work erecting a furnace on his group of cinnabar claims. These are situated fifteen miles up-stream from Georgetown. Two tunnels have been driven into the orebody just above the level of the Kuskokwim. Another crew under H. W. Reeth, of Bethel, Alaska, is at work installing a hydraulic outfit at Golden Gate Falls, on the Riglagolic River, a tributary of the Kuskokwim on the left limit. The plant will be in operation some time in 1920.

Last season a discovery of placer gold was made in the gravels of Watermouse Creek, in the Goodnews Bay district, near the mouth of the Kuskokwim. The gravels average about 4 ft. thick, and yield $4 per sq. ft. A rich strike has been reported near the mouth of the South Fork of the Kuskokwim River, known locally as the Nixon Fork. The ground is being prospected with a power drill with a view of installing machinery later.

Prospecting is being vigorously prosecuted on the Holitna River, a tributary of the Kuskokwim, which comes in thirty miles above Georgetown, and is yielding encouraging results. The gravels are reported to average from 7 to 9 ft. deep, and will average 50c. per foot, 200 ft. wide and 7 miles long. A machine outfit was installed last season on the placer ground on Crooked Creek, but has not been used this season, but a gang of men has been employed to shovel-in. The ground averages $30 a day to the man.

Prospecting and mining on the Kuskokwim is rendered difficult and expensive because of the lack of ocean transportation, and the bringing in of machinery and supplies is accomplished with great difficulty.

Juneau—Alaska Gold Mines Co. in October milled 206,200 tons of ore averaging 80.1c. per ton. Percentage of extraction was 81.88; tailings loss 16.1c. per ton.

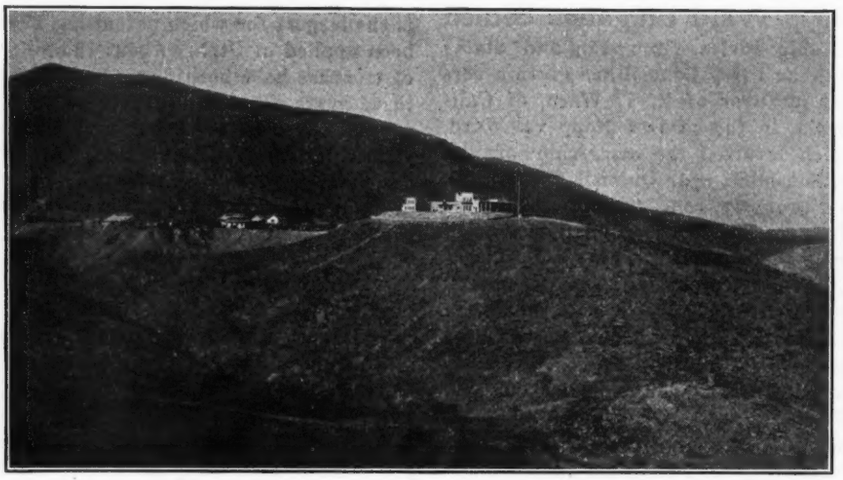
ARIZONA

U. V. EXTENSION BUYS HAYNES GROUP

Jerome—The United Verde Extension Copper Co. has added eight patented claims to its group by the purchase of the property of the West United Verde Copper Co., better known as the Haynes group. The new property has a 1,200-ft. shaft, 2,500 ft. of development on the 700 level, and 300 ft. on the 1,200. George Kingdon, general manager, stated his opinion that "it is good ground, well worth developing, and its purchase was in line with the policy of the Extension company not to rest content with one mine."

Ore trains will be operating by Nov. 15 between the ore pockets of the United Verde Extension mine and the smeltery at Verde, through the 12,000-ft. tunnel, now nearing completion. The tunnel headings were completed last March, but much remained to be done in concreting sections and installing railroad and electric equipment. The railroad is now complete more than half way from the portal. Ore will be handled in 30-ton cars, hauled by electric locomotives. Operation of the tunnel will materially decrease costs. Only one furnace will be operated for the present, turning out about 3,500,000 lb. a month.

The Jerome-Verde Copper Co. will have its annual meeting in Phoenix Nov. 10. For submission to the stockholders, H. P. Henderson, consulting engineer, has prepared a statement of progress for the last year. The production has been 4,709 tons, averaging 9.6 per cent copper and returning in cash $108,359. Development work has aggregated 2,283 ft., and 3,106 ft. of diamond drilling has been done. It is believed that the Main Top orebody, which has been the main producing section, is in a shear zone that continues to the United Verde Extension orebody. It is from 40 to 100 ft. wide and has been opened for 900 ft.



UNITED VERDE EXTENSION COPPER CO.'S PLANT, JEROME, ARIZ. DOUGLAS RESIDENCE IN CENTER

OCTOBER COPPER PRODUCTION

New Cornelia Copper Co., Ajo, produced 3,878,000 lb. of copper in October, compared with 3,898,000 in September.

Calumet & Arizona Mining Co., Bisbee, produced 4,244,000 lb. of copper in October, compared with 3,318,000 in September.

Old Dominion Copper Mining & Smelting Co., Globe, produced 2,365,000 lb. of copper in October, compared with 2,460,000 in September.

CALIFORNIA

THE MOTHER LODE—SAN JOSE

Grass Valley—Unwatering the vertical shaft of the Idaho-Maryland mine to a depth of 240 ft. has been

accomplished by compressed air. The method is so satisfactory that the management expects to clear 1,000 ft. of shaft without resorting to pumps. A temporary hoist has been erected over one shaft compartment, and the shaft is being repaired as rapidly as water is lowered. The hoisting plant is being assembled.

Amador City—The Keystone mill, which was shut down several weeks for repairs, is again closed down on account of an overflow of sand at the stone dam across Amador Creek. The dam is to be raised 20 ft. higher, which will give an added capacity to the impounding basin of 1,500,000 tons.

San Jose—Suit has been filed in San Jose by the California Industrial Accident Commission in the Superior Court, to close the Guadalupe quicksilver mine, on the ground that it was dangerous and a menace to the lives of the miners.

IDAHO

COEUR D'ALENE DISTRICT

Wallace—Practically all stock in the Albany company has been purchased by August Paulsen for $15,000. John H. Nordquist and John Dunphy are the chief stockholders. The company owns eleven claims joining the Omaha group, of which Paulsen is owner and upon which he has done a large amount of development. The Albany will be developed from Omaha workings. The property has two veins, one of which shows lead near surface. Paulsen is one-fourth owner of the Hercules mine.

Adair—The Richmond Mining & Milling Co. has closed down. It has been employing thirty-five men during summer and has been shipping ore. Unsatisfactory treatment charges for the low-grade copper are given as reason for suspension. Failure to find the orebody on the 600 level and unsatisfactory showing on 500 level are believed to have had much to do with the closing down. J. E. Codd, of Spokane, is president.

Mullan—Local stockholders in the National mine, dissatisfied with the action of directors in closing down the property several weeks ago, are considering calling a meeting of stockholders to urge further prospecting. They believe that the main orebody has never been found. There is a large vein near the surface carrying galena and lead carbonate, but deep workings show nothing but low-grade copper. The company has $50,000 in treasury, and the stockholders favor using some of it to prospect with the diamond drill.

MICHIGAN

THE COPPER DISTRICT

Calumet—The Seneca Mining Co.'s shaft is down 1,930 ft. having completed the curve and is two-thirds of the way to the third level station. The raise from the second level has holed through furnishing a pocket. The lateral faces on the second level are the only openings in the Kearsage lode contributing to the stockpile. No ore has been shipped yet for a mill test.

Rockland—At the Michigan mine grading has been completed for 4,500 ft. of railway spur for the C. M. & St. P. Ry. Rails are hard to get and will not be laid for sixty days. Machine drills total twenty-two. The physical showing is maintained.

MINNESOTA

VERMILION RANGE

Ely—The north section of the Chandler mine has resumed with full force, and the south section with about twenty men. Other mines in the district are still down, because of the local strike. Three leaders have been arrested for attempted violence.

MONTANA

Anaconda Copper Mining Co. produced 15,000,000 lb. of copper in October, compared with 12,780,000 lb. in September.

East Butte Copper Mining Co. produced 2,027,340 lb. of copper in October, compared with 2,093,780 lb. in September.

NEVADA

DIVIDE DISTRICT

Divide—On recommendation of George H. Garrey, consulting geologist, the shaft of the Tonopah Divide mine will be sunk from its present depth of 585 ft. to 800 ft, where he believes the water level and sulphide zone will be reached. At the Revert Divide property, John G. Huntington has recently had numerous assays made of ore from the lease owned by himself and partners, the majority of which show ore of shipping grade. A new vein of commercial ore has been opened up on the Belcher Extension. E. Roberts is the engineer in charge. At the Butte Divide, the ore is said to be improving as drifting on the veins proceeds on the 150 level. George Reading is manager.

ELY DISTRICT

Kimberly—The Consolidated Coppermines Co. has started to deepen the Alpha shaft from 1,440 ft. to 1,880 ft. It was expected to start this work last summer, but labor troubles, which affected most of the Nevada mining districts, made it inadvisable to undertake new work at that time. Diamond drilling from the 1,300 level is still going on and will be continued until definite information is obtained as to the depth at which sulphides occur. The present hole, which is the third one drilled, passed through 48 ft. of oxidized ore that averaged 8.5 per cent copper, and for an additional distance of 90 ft. the copper contents averaged over 2 per cent. Ore production has been resumed and will be continued on a limited scale. Shipments from the Alpha mine are at the rate of about 100 tons per day. Considerable ore is also going forward from the Liberty pit, where the Nevada Consolidated Copper Co. is mining ore from Coppermines ground and concentrating it at the Steptoe works under the existing contract between the two companies. E. P. Matthewson, recently consulting metallurgist with the American Smelting & Refining Co., has been engaged as consulting engineer. Under his direction plans will be immediately prepared for the reduction works at Kimberly, which have been under consideration for some time.

DAYTON—AUSTIN—LORING—PIOCHE

Dayton—The Carson River Mills 200-ton cyanide plant, erected to treat an immense pile of tailings from Comstock ores, is operating successfully, according to A. H. Jones, in charge of the Salt Lake City office of Charles Butters & Co., Ltd. Mr. Jones was formerly mill superintendent of the Tonopah Belmont Development Co. The Gold Canyon Dredging Co., which is controlled and managed by Bulkeley Wells, will probably have to defer starting operations until Jan. 1, owing to delay in shipment of equipment resulting from labor troubles in San Francisco. The company has 1,000 acres of placer ground under lease. G. F. Hutton is in charge.

Austin—The Cahill Lode Mining Co., controlled by Jack Cahill, the original discoverer of Birch Creek, is getting ready for operation. The mineralized zone at Birch Creek is about 300 ft. wide, and good pannings are secured at various points across the entire width.

Loring—W. H. Shewan has opened up the cross fissure known as the Silver vein at 200 ft. in the tunnel on the Tennessee claim. This vein carries gold also. Assays will not be made till the whole vein is exposed. On the Banker's Dream property, the Jose Davis Co. has 40 tons of good ore on the dump. The shaft is down 50 ft., and the vein is four ft. wide at the bottom.

Pioche—Ore shipments from Pioche for the week ended Oct. 23 were: Prince Consolidated, 1,500 tons; Virginia Louise, 350; Black Metals, 300; Combined Metals, 50; Ida May, 50, Bristol, 50.

OKLAHOMA

JOPLIN-MIAMI DISTRICT

Petosi (Douthat)—Taken over by R. P. Sharpe, of Miami, who will operate

this plant, which has been idle several months. Was fair producer in 1918.

St. Regis M. & S. (Douthat)—Moving old mill from Joplin to new lease at Picher. Expect to finish by January 1, 1920. Tom Shelton superintendent.

Skelton L. & Z. (Douthat)—Recently took over Lucky Kid mine and mill and are sinking new shaft. Company now has eight mines equipped with concentrators. Frank Childress, Galena, Kan., manager.

Texas (Joplin)—Holman Bros., of Wetumptka, Okla., have started up Texas mine south of Hockerville, after overhauling and improving mill. W. L. Owen, Joplin, manager.

Underwriters (Joplin)—Have contributed six-inch two-stage American pump to Quapaw Drainage Co. for its fight against heavy water. Pump placed in Lucky Extension Co. shaft.

Cedar Bluff (Lincolnville)—Sinking shaft on tract adjoining Mission lease. Company composed of engineers from San Francisco.

Blue Bonnet (Miami)—Has started sinking new field shaft 500 ft. south of mill. Shaft expected to be completed to 250 level in forty days. W. H. Logan, manager.

Reliance (Neck City)—Lead and zinc mill being remodeled; to be completed November 15. J. E. Smith manager.

Big Chief (Picher)—Purchased by R. P. Sharpe and others, of Miami, Okla. Lies just north of Eagle Picher Lead Co.'s Netta property. Sharpe also owns Vantage and Petosi.

Cortez (Picher) — Oberman-Carson re-erecting on Commonwealth lease old True Blue mill from Quapaw; to be completed December 15. M. Lichliter superintendent.

Kitty (Picher)—Operating new shaft recently completed west of mill shaft.

Pittsburgh Miami (Picher)—Purchased by L. V. Rice, of Chicago, who will operate property. H. L. Jones, of Robert W. Hunt Co., superintendent. Plant idle several months.

St. Joe (Picher)—Sludge mill under construction.

Whitebird Addition (Picher)—Larsh-Benentendi lease purchased by E. R. McClelland, of Kansas City, and associates. Shaft in ore will develop property and build mill. Thelst Shelton, Carterville, Mo., manager.

Alamo Lead and Zinc (Quapaw)—Has closed down operations at Lucky Bob mine and will deepen shaft.

Aurora (Quapaw) — Have started Sunnyside mill after shutdown of several months.

Lone Star (Quapaw)—Taken over by A. G. Kelley, who is drilling out tract.

Waxahatchie (Quapaw)—Has begun operating old Wilson mine, southwest of town. Will sink to deeper level, now made possible through draining by Quapaw Drainage Co.

SOUTH DAKOTA

At the Homestake mine at Lead, S. D., the fire which broke out on Sept. 25 is still burning on the 700 level with continued efforts being made to extinguish it. The water used in flooding the workings has reached the 1,250 level, and it will be some time before it reaches the fire. Two deaths have resulted to date as a result of the fire. On Oct. 13, two men employed in removing forms from concrete bulkheads on the 700 level were overcome and died. The company announced on Oct. 16 that declarations of dividends would be suspended for the present.

UTAH

TINTIC DISTRICT

Eureka—The Tintic Standard Mining Co. is installing a large compressor. Two smaller compressors now in use are to be kept in reserve. New ore opened on the 1,350 level southeast of the shaft will afford a large stope. A station is being cut at the 1,450 level, the present bottom of the shaft, and drifting will be started to get under the ore.

The Chief Consolidated Mining Co. is employing about 450. The new three-compartment concrete-lined shaft is down 800 ft. and at 1,000 ft. will be connected with old workings. Ore is being mined throughout the property and from below water level. The pumping capacity has recently been doubled. Surface work and drilling are being done in the eastern section of the camp.

The new wagon road into east Tintic will be completed within a few weeks. It will especially benefit the Eureka Lilly, Eureka Bullion, Big Hill, East Tintic Coalition, and Tintic Standard properties. Later the road may be extended south of the Tintic Standard to reach the Apex Standard, Iron King, Zuma, Eureka Standard, and other properties.

WASHINGTON

Republic—Mines of this district continue shut down owing to the strike that began Oct. 9. The demands made by the workmen were for an increase in pay from $4.50 and $5.00 per day to $5.50 and $6.00—an increase of $1—and also that two men be put on each Leyner drill instead of one.

CANADA

NORTHERN ONTARIO

Port Arthur—The Nicholls Chemical Co., of New York, is about to begin construction of an ore dock on the Mission River, at Fort William, for the purpose of handling pyrites from the Northern Pyrites mine, at North Pines, Ont., and also from its pyrites property at Mokoman, about 30 miles west of Port Arthur. This dock will cost $100,000 and be ready for operation on the opening of navigation in the spring of 1920. It will afford facilities for the shipment of local iron ore.

The syndicate that owns the Ozone Siding zinc property, situated about 70 miles east of Port Arthur, on the line of the Canadian Pacific Ry., is conducting negotiations for the sale of the property. The orebody has been traced for more than a mile. It consists of from 2 to 3 ft. of specular zinc blende, with from 10 to 12 ft. of lower grade ore. The owners are Messrs. Lawrence and Rochon, of Fort William, and Dr. R. J. Manion, of Fort William.

MEXICO

SONORA

El Tigre—Mining conditions at El Tigre are reported to be favorable. The earnings on this property during 1919 have exceeded those of any previous year, and, although no new veins have been discovered, ore has been found at greater depth than ever before. Net earnings for September were $155,000. Political conditions in the vicinity of El Tigre are favorable, and labor is reasonably plentiful. The Lucky Tiger-Combination Gold Mining Co., operating in the district, also owns zinc property in Oklahoma that has been worked to advantage in spite of the low price of zinc during the last year.

NEW SOUTH WALES

Broken Hill—During the six months ended June 30, 1919, North Broken Hill Ltd., of Broken Hill, New South Wales, hoisted 55,072 tons of ore, as compared with 75,155 tons for the previous half year. The falling off was due to the strike which occurred in May, having been caused in the first place by inter-union disputes. All productive work ceased at the North mine on May 8. The low output, combined with the heavy expenditure during the period of suspension, forced working costs up to $8.80 per ton, as against $5.92 for the corresponding period of 1918. The milling plant treated 53,984 tons of crude ore. Working costs were as follows: Mining, $5.95; development, 0.58; and milling, $2.27; total, $8.80 per ton. The company formerly sold its zinc tailings to the Amalgamated Zinc Co., but has completed its contract with the latter, and is now erecting a flotation plant capable of treating the whole output of tailings.

THE MARKET REPORT

Daily and Weekly Metal and Mineral Prices
Metal Market Conditions, Average
Monthly Prices, Stock Quotations

Silver and Sterling Exchange

Oct. Nov.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Nov.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
30	416⅛	123⅜	66½	3	416	122⅜	66
31	416	121⅜	65½	4	....	....	67
1	416	121⅜	65½	5	416¼	123¾	66¾

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

Daily Prices of Metals in New York

Oct. Nov.	Copper Electrolytic	Tin Spot	Lead N. Y.	Lead St. L.	Zinc St. L.
30	21⅛@21¼	54½	6.75@6.85	6½	7.45@7.50
31	21 @21⅛	54½	6.75@6.85	6½	7.40@7.45
1	21 @21⅛	54½	6.75@6.85	6.55@6.60	7.50@7.65
3	20⅞@21⅛	54¼	6.75@6.85	6.60	7.60@7.70
4	.....	.....	.....	.....	.....
5	20¾@21	54@54¼	6.75@6.85	6.60	7.70@7.75

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of American tin, 99 per cent grade.

London

Oct. Nov.	Copper Standard Spot	Copper Standard 3 M.	Copper Electrolytic	Tin Spot	Tin 3 M.	Lead Spot	Lead 3 M.	Zinc Spot	Zinc 3 M.
30	100⅝	101⅜	114	277¼	278	30¾	31	43½	44
31	100½	101⅜	114	275	275½	31⅛	31⅜	44½	45
2	....	....	....	....	....	....	....	....	....
3	99¾	100½	114	273¾	273½	32	32⅜	44½	45
4	99½	100¼	114	273¾	274¼	32½	32¾	44¾	45¼
5	100¾	101¾	113	277	277¼	33	33¼	45	45½

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb.

Monthly Average Prices

	September	October
Copper:		
Electrolytic, N. Y.	21.755c.	21.534c.
Standard, London	£100.767	£103.418
Lead:		
New York	6.108c.	6.487c.
St. Louis	5.853c.	6.249c.
London	£ 25.330	£28.473
Silver:		
New York	114.540c.	119.192c.
London	61.668d.	64.049d.
Tin:		
New York	54.482c.	54.377c.
London	£280.102	£279.239
Zinc:		
New York	7.510c.	7.823c.
St. Louis	7.160c.	7.473c.
London	£ 40.955	£43.630
Pig Iron:		
Bessemer, Pittsburgh	$29.35	$ 29.35
Basic, Pittsburgh	27.15	27.15
No. 2 foundry, Pittsburgh	28.15	28.30

Metal Markets

New York—Nov. 5, 1919

The markets were extremely dull this week. Copper was soft, while lead continued firm. Zinc experienced a further reaction and then a sharp rally.

Transatlantic freights are nominally unchanged. The longshoremen's strike is ended and vessels are being loaded again. The rate from San Francisco to Hongkong and Kobe declined to $15.

Frederick Wallace, general manager of the Waclark Wire Co., died suddenly of double pneumonia Oct. 29. He was a prominent figure in the copper industry, not only as a buyer of copper and a manufacturer of it, but also as a seller, the disposition of the product of the United Verde Copper Co. passing through his hands. He was an extraordinarily hard worker, and without any doubt overworked himself.

Copper

The market was extremely dull, buyers being conspicuous by their absence in all quarters. The small amount of business that was done by producers was at the expense of prices. Wire drawers report continued good business, but apparently they are well supplied with copper for the moment.

Copper Sheets—32½c. per lb. Wire 24½c., weak. Domestic buying dull.

Tin

Business was pretty good, but in view of the approaching release of supplies from the docks, prices became a little easier. Singapore quoted c.i.f. London as follows: £287½ on Oct. 30; £282 on Oct. 31; £272½ on Nov. 3; and £278½ on Nov. 4 and 5.

Lead

The market was quiet and firm. Independent producers appeared to have no difficulty in realizing a premium of 10 points over the price of the A. S. & R. Co.

Zinc

The reaction that was already in course at the end of our last week continued. There was a similar reaction in the London market. New York cabled to London asking explanation, and London cabled New York with similar inquiry. The whole thing was nothing but a bear raid. When the selling by weak hands was ended, the larger producers being in no wise frightened, a

sharp rally ensued, and today the market closed firmly at 6¾c. Right through the week higher prices were asked for futures than for prompt metal. Business, both domestic and foreign, was light, but today considerable inquiry from galvanizers appeared in the market.

The demand for zinc from the brass makers has been relatively small for a long time, and many smelters have discontinued the production of the "brass special" grade of zinc, letting all the draws from the distilling furnace go together. If anybody wants to buy "brass special," he can easily get it at a premium over Prime Western corresponding merely with the extra cost of production, say 5c. to 10c. per 100 lb. The differential between Prime Western and high-grade zincs is not very easy to determine, for the former is sold generally on the basis of St. Louis, while the latter is sold on terms including delivery to the consumer. As a generalization, the present premium for high-grade, reduced to a common marketing point, may be generalized at ¼c. to ½c. per lb.

Zinc Sheets—$10.50 per 100 lb.

Silver—Owing to short London supplies, price has advanced in that market to 67d., under date of Nov. 3. Supplies in New York are moderate, with the East as the destination. No London shipments the last week.

Mexican dollars at New York: Oct. 30, 97; Oct. 31, 92⅞; Nov. 1, 92⅞; Nov. 3, 94⅛; Nov. 4, holiday; Nov. 5, 96½.

Platinum—Stronger. We quote refined ingot at $135.

Palladium—Unchanged at $120.

Aluminum—33c. per lb.

Antimony—We quote spot at 8⅝@8¾c., and futures at 8.90@9c., duty paid.

Bismuth—Unchanged at $2.96.

Cadmium—$1.40@1.50.

Nickel—Ingot, 42c.; shot, 43c.; electrolytic, 45c.

Quicksilver — Quicksilver to arrive was quoted at $80@85, while small lots of spot sold at $90@100. San Francisco telegraphs $82.50, firm.

Tungsten Ore—In general the situation is unchanged. Some high-grade Bolivian ore was reported sold at $10 per unit, while Chinese ore was quoted at $7.

Molybdenum Ore—Unchanged at 75c. per lb. of molybdenum sulphide, but this is merely a nominal quotation.

Manganese Ore—Quoted at about 50c. per unit.

Chrome Ore—Quoted nominally at about $25 per ton, f.o.b. California.

Sulphur—Prices remained unchanged at $18 per ton for domestic and $20 per ton for export at mines, Freeport, Tex., and Sulphur Mine, La. Strike of dock workers in New York is interfering with domestic shipments. Numerous inquiries are being received for export business.

Pyrites—Spanish pyrites is quoted at 17½c. per unit for furnace-size ore, free from fines, c.i.f. New York or other Atlantic ports. Market unsettled.

Fluorspar — Quotations have been made at about $25 a ton f.o.b. mines in Kentucky and Illinois for washed-gravel grade and $16 per ton at mines at Tonuco, N. M., for lump grade. Analyses of these grades show about 85 per cent calcium fluoride and about 5 per cent silica.

Zinc and Lead Ore Markets

Joplin, Mo., Nov. 1.—Zinc blende per ton, high, $48; basis, 60 per cent zinc, premium, $48@46; Prime Western, $45; fines and slimes, $42.50@40; calamine, basis 40 per cent zinc, $30. Average settling prices: Blende, $46.17; calamine, $33.64; all zinc ores, $45.75.

Lead, high, $86.70; basis 80 per cent lead, $85; average settling prices, all grades of lead, $86 per ton.

Shipments the week: Blende, 7,816; calamine, 275; lead, 1,810 tons. Value, all ores the week, $525,700.

The effort to cut prices to $45 basis met with stubborn resistance from sellers, and at a late hour very little ore is sold, sellers still expecting buyers to meet last week's price level tonight. As buyers report light or no orders, the market appears closed.

The lead smeltery of the Ontario Smelting Co. is reported idle, ostensibly from lack of ore.

Platteville, Wis., Nov. 1.—Blende, basis 60 per cent zinc, base price of Prime Western grade lowered $48@47, with still lower offerings at the week end. Exclusive buyers of premium grade blende not in the market. Lead ore, basis 80 per cent lead, $80 per ton. Shipments, curtailed because of car shortage, are as follows: 2,170 tons blende, 186 tons galena, and 341 tons sulphur ore. For the year to date the totals are 84,453 tons blende, 5,524 tons galena, and 16,798 tons sulphur ore. During the week 2,751 tons blende was shipped to separating plants.

Pittsburgh—Nov. 4, 1919

Though the iron and steel strike, now in its seventh week, continues to lose ground, it is still receding more slowly than might have been expected, although more rapidly than in the earlier weeks. Good gains in operation have been made in the Mahoning Valley, where production, only recently resumed, is now about 20 per cent of normal, and about the same statement applies to Cleveland. The Chicago-Gary district situation has improved materially, and production there is perhaps 50 per cent of normal. The Wheeling district remains closed tight. In Western Pennsylvania some vestiges of the strike remain, chiefly in the upper Monongahela Valley region and at one point in the Allegheny Valley. Production of steel in the United States is now 60 to 65 per cent of the rate just before the strike, and is gaining approximately 3 per cent a week. Production of finished material has been at a slightly greater rate than production of steel, as stocks have been drawn upon.

In the last week interest in the iron and steel strike has been overshadowed by the coal strike, as a coal strike such as planned would in the course of from two to four weeks close nearly all the iron and steel plants from lack of fuel. Owing to the attitude of the United States Government and the state and local authorities, intimidation of workers in the non-union fields is forestalled, and the Connellsville region is running full, together with the non-union districts scattered in western Pennsylvania and in West Virginia. It is generally believed now that through the activity of the Government the union miners will soon return to work, without the steel industry having suffered severely from lack of coal. Shipments of coal to steel mills and byproduct ovens are shut off at the moment by the priority system. Collapse of the coal strike may hasten the end of the steel strike, but the latter has little organization, and those who produced it may be unable to call it off, even if willing; so the strike may have to die a natural death.

It is to be presumed that finished steel products are scarce, but there is little evidence of scarcity among manufacturing consumers, and it is possible that they were stocked before the strike to a greater extent than was generally known. Jobbers' stocks, on the other hand, show signs of growing ragged.

A little business is being done in prompt deliveries of steel, at premiums. Large producers, who make a practice of contracting with customers, continue to book business, though in reserved manner, and of course at Mar. 21 prices, as the Steel Corporation is strongly opposed to advances, and the Corporation now has a considerable following in that course.

Pig Iron—The local market has stiffened sharply, but is not clearly defined, for the reason that large advances are obtainable on prompt shipment of foundry and malleable iron, and for 1920 deliveries buyers are unwilling to take hold, and there is scarcely any demand

for basic or bessemer, either prompt or forward. Claims are made that small lots of prompt foundry have brought $30 to $33, furnace, whereas basic is not quotable above the old price of $25.75, and the market could not stand such a spread, as furnaces would shift from basic to bessemer. For forward delivery we quote foundry up $2 a ton, making the market as follows: Bessemer, $27.95; basic, $25.75; malleable, $28.75; foundry, $28.75; forge, $27.75. At Valley furnaces, with $1.40 freight to Pittsburgh.

Ferromanganese—One or two sales of English ferromanganese are reported at $100, c.i.f., but with the iron and steel strike and the longshoremen's strike there is practically no activity, and $100 is not an open quotation on English. Domestic producers still quote $110, delivered. Spiegeleisen is $33@35, furnace.

Steel—Sheet bars are in demand, with scarcely any offerings, and would probably bring $45, Pittsburgh, for prompt. Billets are said to have sold in the East at $5 above Mar. 21 prices, which are: Billets, $38.50; sheet bars and small billets, $42; slabs, $41; rods, $52.

Coke—Furnaces as a rule are out of the market, but occasionally a furnace will pay an exceptional price, and no furnace coke is offered at ordinary prices. Sales of Connellsville furnace coke occurred this morning at $5.75. Foundry coke is in good demand, as coal is being shut off from some byproduct ovens making foundry grade. We quote Connellsville foundry coke at $7@7.25 per net ton at ovens.

Metal Markets

New York—Nov. 12, 1919

Several of the important metals exhibited peculiar features this week. All of the markets were manifestly influenced by the severe break in the stock market, the advance in the rate for money, and the declared intention of the Federal Reserve Board to check speculation.

With the settlement of the longshoremen's strike in New York, transatlantic freights became easier, as was anticipated. To British ports $12@12.50 could be obtained; to Havre, $12.50; to Hamburg, $12; and to Rotterdam, $10. The rate from San Francisco to Hongkong and Kobe remained at $15.

Stock of metals in the hands of the War Department, Oct. 30, 1919, were reported as follows: Brass, 70-30, 47,326 tons; brass, 60-40, 15,281 tons; lead, miscellaneous scrap, 2,140 tons; zinc, 7,284 tons.

Silver and Sterling Exchange

Nov.	Sterling Exchange	Silver		Nov.	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
6	415¾	123⅝	66¾	10	413⅞	127	68⅞
7	415¾	123⅝	66¾	11	412	126½	68⅞
8	414	123⅝	67	12	411	126½	69

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

Daily Prices of Metals in New York

Nov.	Copper	Tin	Lead		Zinc
	Electrolytic	Spot	N. Y.	St. L.	St. L.
6	20¾@21	54	6.75@6.85	6.60	7.75
7	20¾@21	54	6.75@6.85	6.60	7.75
8	20¾@21	53⅞	6.75@6.85	6.60	7.75
10	20⅜@20⅞	53½	6.75@6.90	6.60@6.70	7.75@7.85
11	20¼@20½	53¼@53⅜	6.75@6.95	6.60@6.70	7.80@8.00
12	20¼@20⅜	53¼@53⅜	6.75@6.95	6.65@6.75	7.80@8.05

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of American tin, 99 per cent grade.

London

Nov.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3 M.		Spot	3 M.	Spot	3 M.	Spot	3 M.
6	100¾	102	113	279	279	33¼	33½	44½	45¼
7	100¼	101½	113	278½	278¾	33½	33¾	44¾	45½
8	....	....	....	....	....	....	....	....	....
10	100¼	101¼	112	279¼	279½	33⅝	33⅞	44¾	45¾
11	100¾	102	112	278½	279	33¾	34⅛	46¼	46¾
12	100¾	102	112	281¾	282¾	34⅝	34¾	47½	48¼

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb.

Copper

All of the producers were seeking business this week and fishing for what they could get, without being too particular as to prices. There was very little comparing of notes. The result was a highly irregular market, and the circulation of rumors which had varying degrees of foundation. Everybody did a little business, but nobody did much, and the aggregate of all did not amount to much. Manufacturers, both wire-drawers and brass-makers, reported continuance of good business, but at the same time disclaimed much necessity for taking in more copper right away. A small amount of export business was done during the week.

Up to Monday prices held pretty firmly on an average basis of 20⅞c., f.o.b. New York refineries, but during Monday copper became easily obtainable from large producers on the basis of 20⅜c., and later that price could be shaded. The bulk of the business of the week seems to have been done at 20⅜c. The banking position undoubtedly had an important effect on the market.

Copper Sheets—31½c. per lb. Wire 24½c., weak. Domestic buying dull.

Tin

The market became easier through the release of some of the large supply of metal that had previously been tied up on the docks. Throughout the week there was a good deal of irregularity. On one day electrolytic sold at 55c. and Straits at 54½c. at the same time. Later Straits declined to 53½c. Tin of 99 per cent grade declined from the beginning to the end.

Singapore quoted c. i. f. London, £279½ on Nov. 6 and £282 on Nov. 11 and 12. The cables were not received for the other days.

Lead

A fair amount of business was done, but it was limited by the supplies available. There were two conflicting factors in the market, one being producers who were willing to promote a further advance and the other, producers who desired to keep on the brakes. The latter would sell to none but consumers and accepted prices lower than they might otherwise have obtained. These conditions explain variations in prices.

The St. Louis market continued to be the truest index.

Some small export business to France was booked, and further inquiries from that quarter are pending. The price for bonded lead advanced to 6½c., New York.

Zinc

The market continued firm at 7.75c. until Monday, when there developed an urgent demand, which was apparently of speculative character and looked like the covering of contracts that had previously been sold for export. This resulted in curious conditions, the market being bid up sharply on zinc originating west of the Mississippi River, while producers east of the river who had determined to sell only to consumers offered zinc, St. Louis basis, at much lower prices than would be received by producers in Kansas and Oklahoma. Today business was reported done at 8.05c. for zinc west of the river, while consumers could buy it from works east of the river on the basis of 7.80c.

Of consumers' buying there was little during the week, but toward the close there were more inquiries, especially from galvanizers.

Zinc Sheets—$10.50 per 100 lb. less 8 per cent on carload lots.

Silver—Operations have been on an advancing market. London has been seeking silver at higher prices, owing to the scarcity of supplies in that market. It must, however, be said that more free offerings of the metal in London would have the effect of lowering the price for China, as the Eastern banks base their figures on London quotations as well as on the exchange quotation from the Orient on London. Shipments to Europe from New York for the week ended Nov. 6 were very small—only 32,000 oz.

Mexican dollars at New York: Nov. 6, 96½; Nov. 7, 96½; Nov. 8, 96½; Nov. 10, 99; Nov. 11, 98¾; Nov. 12, 99½.

Platinum—Refined ingot unchanged at $135.

Palladium—Unchanged at $120.

Aluminum—33c. per lb.

Antimony—The market was stronger, reflecting the effects of higher prices for silver, and also the increasing scarcity of metal in China. We quote spot at 9c., and futures at the same figure.

Bismuth—Unchanged at $2.96.

Cadmium—$1.40@1.50.

Nickel—Ingot, 42c.; shot, 43c., electrolytic, 45c.

Quicksilver—The market continued firm, with spot quoted at $90@95, and metal to arrive at $80@85. San Francisco telegraphed $82.50, steady.

Tungsten Ore—No business was reported. Chinese wolframite was quoted nominally at $7, high-grade wolframite at $10, and scheelite at $15, f.o.b. mines.

Molybdenum Ore—No business reported.

Chrome Ore—Charles Hardy reports that a fair tonnage of New Caledonia ore was sold at 80c. per unit.

Pyrites—Spanish pyrites is quoted at 17½c. per unit for furnace-size ore, free from fines, c.i.f. New York, or other Atlantic ports. Market unsettled.

Zinc and Lead Ore Markets

Joplin, Mo., Nov. 8.—Zinc blende, per ton, high, $48.40; basis 60 per cent zinc, premium, $48.50; price Western, $47.50; fines and slimes, $45@42.50; calamine, basis 40 per cent zinc, $30. Average settling prices: Blende, $45.81; calamine, $33; all zinc ores, $45.67.

Lead, high, $87.10; basis 80 per cent lead, $85@88; average settling price, all grades of lead, $86.26 per ton.

Shipments the week: Blende, 7,718; calamine, 156; lead, 1,551 tons. Value all ores the week, $493,410.

The $88 basis price of lead came about by spirited competition between two buyers for a choice lot of ore.

Sellers holding firm for $50 basis this week succeeded in advancing the market $2.50 per ton to $47.50, and sold freely on this market. Buying was largely increased over last week, and it is estimated 7,500 to 9,000 tons were purchased.

Platteville, Wis., Nov. 8.—Blende, basis 60 per cent zinc, $50 per ton for Prime Western grade. Lead ore, basis 80 per cent lead, $82 per ton. Shipments for week are 2,268 tons blende, 136 tons galena, and 313 tons sulphur ore. For the year to date the totals are 86,721 tons blende, 5,660 tons galena, and 17,111 tons sulphur ore. Shipped to separating plants during week, 2,696 tons blende.

Iron Trade Review

Pittsburgh—Nov. 11

The Steel Corporation's unfilled obligations increased by 188,030 tons during October, this being about 14 per cent of the month's capacity. Shipments just before the strike were at the rate of about 85 per cent of capacity, and shipments in October were about 60 per cent as great, or at about 51 per cent of capacity. Thus the October bookings were about 65 per cent of capacity. These bookings were confined almost entirely to contract tonnage with regular customers, many customers being allotted less tonnage than they desired. The Corporation being already sold far ahead, the bookings were necessarily for 1920, and practical proof is furnished of the Corporation's now well-known intention to maintain March 21 prices without change, despite the scarcity of steel and the desire of many independent producers that there be advances. Many leading independents, if not all the large ones, will follow the Corporation's policy.

In this the eighth week of the iron and steel strike, production and shipments of steel are about 70 per cent of the pre-strike rate. Wherever the strike remains it is losing ground, except in the case of the Wheeling district, and at a more rapid rate than formerly. The strike as a strike will soon be over, but afterward production will be restricted by the disorganization of working forces, which will be repaired only slowly. There will be an extension of the eight-hour day, adding to the difficulty of building up full working forces. With the railroads about to enter the market to a greater or less extent, steel promises to be in scant supply for a long time, and this in itself is one reason for large interests being opposed to the relation between demand and offerings being allowed to dictate the market price.

Pig Iron—Foundry and malleable grades have been bringing fancy prices for early shipment, up to $32 or $33, Valley, and furnaces have been refraining from selling for extended delivery, whereby some of them evidently hope to develop an extended delivery market on the basis of the prompt market. Some makers of bessemer and basic are opposed to there being large advances from the March 21 schedule. Basic and bessemer have sold as substitutes for foundry and malleable at prices above what they would bring for their regular purposes, and conservative interests regard as the actual market the prices that have been obtained for these grades when sold for regular purposes, latest sales of this description being at $27.25 for basic and $28.50 for bessemer, Valley. We quote the market at $28.50 for bessemer, $27.25 for basic, and $30@33 for malleable and foundry, f.o.b. Valley furnaces, freight to Pittsburgh being $1.40.

Steel—Despite the great curtailment in production of billets and sheet bars, there is no heavy demand. Leading producers continue to regard the market at March 21 prices: Billets, $38.50; sheet bars and small billets, $42; slabs, $41; rods, $52. Some prompt lots of billets and sheet bars have been sold at premiums of $3 to $5.

Finished Steel—Basis prices for finished steel products continue to be at the March 21 schedule, but prompt lots of merchant bars have sold at $3 premium, or 2.50c.

CURRENT PRICES—MATERIALS AND SUPPLIES

IRON AND STEEL

SHEETS-Quotations are in cents per pound in various cities from warehouse also the base quotations from mill:

Blue Annealed	Large Mill Lots Pittsburgh	St. Louis	Chicago	San Francisco	New York Current	New York One Yr.Ago
No.10	3.55	4.64	4.57	5.80	4.62	5.52
No.12	3.60	4.69	4.62	5.75	4.67	5.57
No.14	3.65	4.74	4.67	5.90	4.92	5.62
Black						
Nos.18 and 20	4.15	5.24	5.42	6.75	5.80	6.32
Nos.22 and 24	4.20	5.29	5.47	6.80	5.85	6.37
No.26	4.25	5.34	5.52	6.95	5.90	6.42
No.28	4.35	5.67	5.62	7.05	6.00	6.52
Galvanized:						
No.10	4.70	5.79	5.97	....	6.15	6.87
No.12	4.80	5.89	6.07	7.30	6.20	6.92
No.14	4.80	5.89	6.07	7.30	6.25	6.97
Nos.18 and 20	5.10	6.19	6.37	7.60	6.55	7.27
Nos.22 and 24	5.25	6.34	6.52	7.75	6.70	7.32
No.26	5.40	6.49	6.67	7.90	6.85	7.47
No.28	5.70	7.04	6.97	8.20	7.25	7.77

STEEL RAILS-The following quotations are per gross ton f.o.b.Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5¢ per 100 lb. is charged extra:

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago Current	Chicago One Year Ago
Standard bessemer rails	$45.00	$55.00	$45.00	$65.00
Standard openhearth rails	47.00	57.00	47.00	67.00
Light rails, 8 to 10 lb.	2.58 1/2*	3.36*	2.581/2*	3.865*
Light rails,12 to 14 lb.	2.54*	3.09*	2.54*	3.09*
Light rails,25 to 45 lb.	2.45*	3.00*	2.45*	3.00*

*Per 100 lb.

TRACK SUPPLIES-The following prices are base per 100 lb.f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	PITTSBURGH Current	PITTSBURGH one Year Ago	Chicago	St.Louis	San Francisco
Standard railroad spikes, 9/16 in. and larger	$3.35	$3.90	$4.27	$4.44	$5.65
Track bolts	4.35	4.90	5.17	Premium	6.65
Standard section angle bars	3.00	3.25	4.22	Premium	4.60

STRUCTURAL MATERIAL-The following are the base prices f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill Pittsburgh	New York Current	New York 1 Yr. Ago	St. Louis	Chicago
Beams, 3 to 15 in.	$2.45	$3.47	$4.245	$3.54	$3.47
Channels, 3 to 15 in.	2.45	3.47	4.245	3.54	3.47
Angles, 3 to 6 in.,1/4 in. thick.	2.45	3.47	4.245	3.54	3.47
Tees, 3 in. and larger	2.45	3.52	4.245	3.54	3.47
Plates	2.67	3.67	4.495	3.54	3.67

STEEL SHEET PILING-The following price is base per 100 lb.f.o.b.Pittsburgh, with a comparison of a month and a year ago:

Current	One Month Ago	One Year Ago
$2.55	$2.55	$4-5

RIVETS-The following quotations are per 100 lb.:

	Mill Pittsburgh	New York Current	New York One Year Ago	Chicago	St. Louis	San Francisco	Dallas
	STRUCTURAL Warehouse						
3/4 in.& larger	$4.20	$5.00	$5.65	$4.72	$4.79	$6.05	$7.50
	CONE HEAD BOILER						
3/4 in.& larger	4.30	5.10	5.75	4.82	4.89	6.15	7.50
7/8 & 11/16	4.45	5.25	5.90	4.97	5.04	6.30	7.50
1/2 & 9/16	4.70	5.50	6.25	5.32	5.29	6.65	7.75

Lengths shorter than 1 in. take an extra of 50¢. Lengths between 1 in. and 2 in. take an extra of 25¢.

WIRE ROPE-Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Hercules red strand, all constructions	20%
Patent flattened strand special & cast steel	20%
Patent flattened strand iron rope	5%
Plow steel round strand rope	35%
Special steel round strand rope	30%
Cast steel round strand rope	22 1/2%
Iron strand and iron tiller	5%
Galvanized iron rigging and guy rope	+12%

San Francisco: Galvanized, less 5%, bright, less 25%.
Chicago, +5 on galvanized, 50-2 1/2 off on bright.

HORSE AND MULE SHOES-Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St.Louis	Denver	Birmingham
Straight	$5.75	$7.50	$6.50	$7.25	$8.15	$7.75
Assorted	....	7.50	6.50	7.50	8.40	7.60

BAR IRON AND STEEL-Per 100 lb. to large buyers at mill, Pittsburgh:
Iron Bars $3.00 Steel bars $2.50

COAL BIT STEEL-Warehouse price per pound is as follows:

New York	Cincinnati	Birmingham	St.Louis	Denver	Chicago
$0.10	$0.16 1/2	$0.18	$0.11	$0.18 1/2	$0.145

DRILL STEEL-Warehouse price per pound:

	New York	St. Louis	Birmingham	Denver
Solid	10-14¢	13.2¢	15¢	15¢
Hollow	17¢	.....	.....	22¢

STEEL AND IRON PIPE-The following discounts are for carload lots f.o.b Pittsburgh,basing card of National Tube Co.for steel pipe,Cardry A. M. Byer's for iron,both dated Mar. 21,1919.

Inches	Steel Black PerCent	Galvanized PerCent	Inches	Iron Black PerCent	Galvanized PerCent
	BUTT WELD				
3/4 to3	57 1/2	44	3/4 to 1 1/2	39 1/2	23 1/2
	LAP WELD				
2	50 1/2	38	1 1/4	24 1/2	9 1/2
2 1/2 to 6	53 1/2	41	1 1/2	31 1/2	17 1/2
7 to 12	50 1/2	37	2	32 1/2	18 1/2
13 and 14	41	..	2 1/2 to 6	34 1/2	21 1/2
15	38 1/2	..	7 to 12	31 1/2	18 1/2
	BUTT WELD,EXTRA STRONG PLAIN ENDS				
1/8,1/4 &3/8	46 1/2	29	1/8,1/4 & 3/8	28 1/2	11 1/2
1/2	51 1/2	39	1/2	33 1/2	20 1/2
3/4 to 1 1/2	55 1/2	43	3/4 to 1 1/2	39 1/2	24 1/2
2 to 3	56 1/2	44			
	LAP WELD,EXTRA STRONG PLAIN ENDS				
2	48 1/2	37	1 1/4	25 1/2	10 1/2
2 1/2 to 4	51 1/2	40	1 1/2	31 1/2	17 1/2
4 1/2 to 6	50 1/2	9	2	33 1/2	20 1/2
7 to 8	46 1/2	35	2 1/2 to 4	35 1/2	23 1/2
9 to 12	41 1/2	28	4 1/2 to 6	34 1/2	22 1/2
			7 to 8	26 1/2	14 1/2
			9 to 12	21 1/2	9 1/2

From warehouses at the places named the following discounts hold for steel pipe:

	New York Black	Cleveland Black	Chicago Black
3/4 to 3 in.butt welded	47%	43 1/2%	57 1/2%
3 1/2 to 6 in.lap welded	42%	45 1/2%	53 1/2%
	New York Galvanized	Cleveland Galvanized	Chicago Galvanized
3/4 to 3 in.butt welded	31%	34 1/2%	44%
3 1/2 to 6 in.lap welded	27%	30 1/2%	41%

Malleable fittings, Class B and C, from New York stock sell at list plus 12 1/2%. Cast iron, standard sizes, 10-5%

NUTS-From warehouse at the places named,on fair-sized orders, the following amount is deducted from list:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Hot pressed square	List	$2.50	$2.25	$1.20	$1.85	$1.05
Hot pressed hexagon	List	2.50	2.25	1.00	1.85	.85
Cold punched square	List	2.50	2.25	.75	1.30	1.00
Cold punched hexagon	List	2.50	2.25	.75	1.30	1.00

Semifinished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	70-5%	50%
Chicago	50%	50%
Cleveland	60-10%	50%

MACHINE BOLTS-Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
3/8 by 4 in. and smaller	40%	50%	50-5%
Larger and longer up to 1 in.by 30 in.	50%	40%	40-5%

WASHERS-From warehouses at the places named the following amount is deducted from list price:
For wrought-iron washers:
New York..... $1.25 Cleveland..... $3.75 Chicago..... $3.00
For cast-iron washers the base price per 100 lb.is as follows:
New York..... $7.00 Cleveland..... $3.75 Chicago..... $4.25

CONSTRUCTION MATERIALS

ROOFING MATERIALS-Prices per ton f.o.b. New York and Chicago:

	Carload Lots N.Y.	Carload Lots Chicago	Less Than Carload Lots N.Y.	Less Than Carload Lots Chicago
Tar felt(141b.per square of 100 sq.ft.)	$60.00	$60.50	$61.00	$61.50
Tar pitch(in 400-lb.bbl.)	21.00	18.00	22.00	19.00
Asphalt pitch(in barrels)	34.00	34.00	37.50	37.50
Asphalt felt	63.00	63.00	67.50	67.50

PREPARED ROOFINGS-Standard grade rubbered surface, complete with nails and cement,costs per square as follows in New York, St. Louis, Chicago and San Francisco:

	1-Ply c.l.	1-Ply l.c.l.	2-Ply c.l.	2-Ply l.c.l.	3-Ply c.l.	3-Ply l.c.l.
No. 1 grade	$1.50	$1.75	$1.90	$2.15	$2.30	$2.55
No. 2 grade	1.35	1.60	1.70	1.95	2.05	2.30

Asbestos asphalt-saturated felt(141b.per square)costs $1.56 per ton
Slate-surfaced roofing(red and green)in rolls of 108 sq.ft. costs $2.25 per roll in carload lots and $2.50 for smaller quantities.
Shingles, red and green slate finish, cost $6.00 per square in carloads, $6.25 in smaller quantities, in Philadelphia.

HOLLOW TILE

	4x12x12	8x12x12	12x12x12
St. Paul	$0.065	$0.135	$0.185
Seattle	.09	.175	.30
Los Angeles	.082	.154	.236
New Orleans	.165	.22	.325
Cincinnati	.08	.15	.215
Birmingham	.072	.135	....
St. Louis	.08	.15	....

*F. o. b. factory, 4, 8 and 10 inch.

LUMBER---Price per M in carload lots:

	8 x 8-In. x 20 Ft. and Under				20 Ft. and Under	12x12-In. and Under
	P	Fir.	Hemlock	Spruce	P.	Fir.
Boston	$50.00	$50.00	$49.00	$49.00	$50.00	$50.00
Kansas	51.00	51.25	51.25	.....	57.00	48.50
Seattle	.....	30.00	.....	.....	.....	31.00
New Orleans	45.00	.....	.....	.....	48.00	.....
St. Paul	60.00	59.00	59.00	46.00	42.00	56.00
Atlanta	58.00	60.00	61.00	72.00	72.50	74.50

	1-In. Rough, 10 In. x 16 Ft. and Under			2-In. T. and Gr. 10In. x 16Ft.	
	P.	Fir.	Hemlock	P.	Fir.
Boston	$50.00	$50.00	$48.00	$50.00	$50.00
Kansas	78.50	64.75	64.75	81.75	77.75
Seattle	.....	31.50	.....	.....	31.50
New Orleans	54.00	.....	.....	55.25	.....
St. Paul	58.00	55.00	54.00	65.00	56.00
Atlanta	58.00	60.00	61.00	72.80	74.50

*2x8 costs $56. Up to 32 ft., above that add $4. Also tamarac Los Angeles--Base price (2x3x16 ft.), Douglas Fir or hemlock, $43. Detroit---Base price, yellow pine (8x8x20), $43.

NAILS---The following quotations are per keg from warehouse:

	Mill Pittsburgh	St. Louis	Dallas	Chicago	San Francisco
Wire	$3.50	$3.90	$5.00	$3.90	$5.00
Cut	3.50	5.40	6.40	5.00	6.65

PORTLAND CEMENT-----These prices are for barrels in carload lots, without bags.

	Current	One Month Ago	One Year Ago with bags.
New York-(delivered)	$2.80	$2.30	$4.00
Jersey City-(delivered)	2.47	2.27	3.64
Boston	2.43	2.42	3.67
Chicago	2.00	2.00	2.45
Pittsburgh	2.05	2.05	2.55
Cleveland	2.32	2.32	2.72
Denver	2.67	2.67	3.67

Note----Charge for bags is generally 15¢. each, 60¢. per bbl.

LIME-Warehouse prices:

	Hydrated per Ton		Lump per 200-LB. Barrel	
	Finished	Common	Finished	Common
New York	$17.50	$14.50	$2.90*	$2.65*
Kansas City	21.00	21.00	2.30	2.20
Chicago	18.00	17.50	1.80	1.10
St. Louis	22.00	18.00	....	2.00
Boston	22.00	18.25	3.70*	3.40*
Dallas	30.00	.....	2.75	....
San Francisco	30.00	.....	2.80†	....
St. Paul	23.00	20.00	1.60	1.50
New Orleans	.....	17.50	....	2.20
Atlanta	.....	1.20 (bbl.)	1.80	1.95
Denver	.....	26.25	....	2.50

*300-lb. barrels. †Per 180-lb. barrel.

NOTE--Refund of $.10 per barrel.

LINSEED OIL-These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Raw per barrel (5 bbl. lots)	$1.75	$1.90	$2.50	$2.10	$1.92	$2.05
5-gal. cans	1.90	2.00	2.75	2.25	2.07	2.25

WHITE AND RED LEADS-500-lb. lots sell as follows in cents per pound:

	Red				White	
	Current		1 Year Ago		Current	1 Yr. Ago
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
100-lb. keg	13.00	14.50	14.00	14.50	13.00	14.00
25-and 50-lb. kegs	13.25	14.75	14.25	14.75	13.25	14.20
121/2-lb. keg	13.50	15.00	14.50	15.00	13.50	14.50
5-lb. cans	15.00	16.50	.....	.....	15.00	16.00
1-lb. cans	16.00	17.50	.....	.....	16.00	17.00

MINING AND MILLING SUPPLIES

HOSE-

	FIRE	50-Ft. Lengths
Underwriters' 2 5/8-in.		$.75 per ft.
Common, 2 1/2-in.		40%

	AIR		
	First Grade	Second Grade	Third Grade
3/4-in. per ft.	$0.50	$0.33	$0.22

STEAM-DISCOUNTS from LIST

First Grade---------- 30% Second Grade--40% Third Grade--45%

LEATHER BELTING-Present discounts from list in the following cities are as follows.

	Medium Grade	Heavy Grade
New York	45%	35%
St. Louis	40%	35%
Chicago	45%	40%
Birmingham	35%	30%
Denver	35-5%	30%
Cincinnati	30-5-2 1/2%	40-2 1/2%

RAWHIDE LACING--50% off for cut; $0.62 per sq.ft. for side lacing.

MANILA ROPE-For rope smaller than 5/8-in. the price is 1/2 to $0.02 extra; while for quantities amounting to less than 600 ft. there is an extra charge of $0.01. The number of feet per pound for the various sizes is as follows: 5/8-in.,8 ft., 3/4-in.,6; 7/8-in.,4 1/2; 1-in., 1 1/2-in.,2 ft. 10 in.; 1 1/4- in.2 ft. 4 in. Following is price per pound for 5/8 in. and larger, in 1200-ft. coils:

Boston	$0.27 1/2	Denver	$0.29 1/2
New York	.27	Kansas City	.27
Cincinnati	.29	New Orleans	.25 1/2
Chicago	.26 1/2	Seattle	.25
St. Paul	.26	St. Louis	.26 1/2
San Francisco	.24	Atlanta	.29 1/2

PACKING-Prices per pound:

Rubber and duck for low-pressure steam	$0.90
Asbestos for high-pressure steam	1.50
Duck and rubber for piston packing	1.00
Flax, regular	1.20
Flax, waterproofed	1.60
Compressed asbestos sheet	.90
Wire insertion asbestos sheet	1.10
Rubber sheet	.50
Rubber sheet, wire insertion	.70
Rubber sheet, duck insertion	.50
Rubber sheet, cloth insertion	.30
Asbestos packing, twisted or braided and graphited, for valve stems and stuffing boxes	1.20
Asbestos wick, 1/2-and 1 lb. balls	.85

REFRACTORIES-Following prices are f. o. b. works:

Chrome brick	net ton	$90-1.00	at Chester, Penn.
Chrome cement	net ton	45-50	at Chester, Penn.
Clay brick, 1st quality fireclay	1000	36-45	at Clearfield, Penn
Clay brick, 2nd quality	1000	30-35	at Clearfield, Penn
Magnesite, dead burned	net ton	32.50	at Chester, Penn.
Magnesite brick, 9x4 1/2x2 1/2 in.	net ton	80-90	at Chester, Penn.
Silica brick	1000	41-45	at Mt. Union, Penn.

Standard size fire brick, 9 x4 1/2x2 1/2 in. The second quality is $4 to $5 cheaper per 1000.

St. Louis-Fire Clay, $30 to $40.

Birmingham-Fire clay, $41-$44; silica, $46.50-$54.50; magnesite, $80 $85; chrome, $80 to $90.

Chicago-Second quality, $25 per ton.

Denver-Silica is $35 per 1000.

RAILWAY TIES-For fair size orders, the following prices per tie hold:

Material	7 in. x 9 in. by 8 Ft. 6 in.	6 in. x 8 in by 8 Ft.
Chicago..... Plain	$1.48	$1.33
San Francisco..Douglas Fir-Green	1.35	.96
San Francisco..Douglas Fir-Creosoted	2.70	1.92

Prices per tie at Missouri mills; St. Louis prices about 25¢ higher:

	Untreated A Grade White Oak 6x6x8		Untreated A Grade Red Oak 6x6x6
No. 1	$0.70	No. 1	$0.55
No. 2	.80	No. 2	.65
No. 3	.90	No. 3	.75
No. 4	.98		
7x9x8 white oak	1.05		
7x9x8 red oak, No. 4	.80	No. 5	.87

FLOTATION OILS-Prices of oils for flotation, in cents per gal. in bbls

	New York	Chicago In Bbl.	Chicago Carloads	Denver
Pure steam-distilled pine oil, sp.gr. 0.925-0.94	$1.10	$1.05	$1.00	$ 0.85
Pure destructively distilled pine oil	1.00	.95	.90	.85
Pine tar oil, sp.gr. 1.02-1.035	.45	.36	.34	.55-.60
Crude turpentime	.65	.68	1.68	.30
*Hardwood creosote, sp.gr. 0.96-0.99	.30	.....	.....	.25-.30

*F.o.b. Cadillac, Mich.

COTTON WASTE-The following prices are in cents per pound:

	New York Current	One Year Ago	Cleveland	Chicago
White	13.00	11.00	14.00	11.00 to 14.00
Colored mixed	9.00 to 12.00	8.50-12.00	11.00	9.50 to 12.00

WIPING CLOTHS-Jobbers' price per 1000 is as follows:

	13 1/4x13 1/4	13 1/4x1 1/2
Cleveland	$52.00	$58.00
Chicago	41.00	43.50

EXPLOSIVES-Price per pound of dynamite in small lots and price per 25 lb. keg for black powder:

	Low Freezing 20%	Gelatin 40%	Gelatin 60%	Gelatin 80%	Black Powder
New York	.....	$0.27 1/2	$0.30	.....	$2.40
Boston	$0.29 1/4	.24 1/4	.26 3/4	$0.31	2.20
Cincinnati	.18 3/4	.21 1/4	.23 1/4	.....	2.35
Kansas City	.19	.23 3/4	.26 1/4	.30	2.45
New Orleans	.23 3/4*	.22 3/4	.24 3/4	.....	....
Seattle	.14 1/4	.18 1/2	.25 1/2	.31 1/2	1.90
Chicago	.18 3/4	.21 1/4	.25 1/2	.29 3/4	2.15
St. Paul	.19	.23 3/4	.26 1/4	.....	2.45
St. Louis	.19	.23 1/4	.25 3/4	.30	2.40
Denver	.17 3/4	.22	.24 1/2	.28 3/4	2.25
Dallas			.286	.342	2.75

*50%

CHEMICALS

SODIUM CYANIDE-New York price is 31c. per lb.; Denver, 37c.; Chicago, 31 1/2 c.; St. Louis, 31c

SODIUM SULPHIDE-New York price per pound is .05c. for concentrated, 3c. for crystals. Denver price is 7 1/2c. for crystals. Chicago, 5c., for concentrated, 3c. for crystals. Concentrated comes in 500-lb. drums, crystals in 440-lb. bbl.

ZINC DUST-For 350 mesh the New York price is 10c. per lb; Chicago, 12c Denver, 22c. St. Louis, 15c.

ALUMINUM DUST-Chicago price is $1.10 per lb.

MINERS' LAMP CARBIDE-Prices net f.o.b. cars at warehouse points.

	Union 100-Lb. Drums Per Ton	Cameo 100-Lb. Drums Per Ton	Union 25-Lb Per Ton
East of the Mississippi, North of Chattanooga	$106.00	$101.00	$1.52
Southeastern portion U.S.A.	115.50	110.50	1.63
Texas (except El Paso)	124.00	119.00	1.74
El Paso, Texas	126.00	121.00	1.77
Denver, Colo.	124.00	119.00	1.74
West Coast	129.00	124.00	1.81